



The Dock and Harbour Authority

No. 281. Vol. XXIV.

Edited by BRYSSON CUNNINGHAM, D.Sc. B.E., F.R.S.E., M.Inst.C.E.

March, 1944

CONTENTS

EDITORIAL	245	THE DOCK AND HARBOUR AUTHORITIES' ASSOCIATION	255
THE GREAT MISSISSIPPI PORT OF NEW ORLEANS	247	NOTES ON DOCK WALL DESIGN AND CONSTRUCTION	258
NOTES OF THE MONTH	252	TIDAL LEVELS OF THE THAMES	261
LABOUR CONDITIONS AT THE PORT OF GLASGOW	253	INLAND WATERWAYS IN MODERN TRANSPORTATION	260
NOTABLE PORT PERSONALITIES	253	NATIONAL ASSOCIATION OF PORT EMPLOYERS	266
PROPOSED HARBOUR OF REFUGE AT ST IVES	254		

Editorial Comments

A Great Mexican Gulf Port.

The leading place in this month's issue is taken by the authoritative Paper on the Port of New Orleans which was contributed to the recent 32nd Annual Convention of the American Association of Port Authorities by Mr. J. A. McNiven, the Chief Engineer of the Harbour Commissioners. It will be found a most interesting account of the quayside operations now being carried on at the renowned port located near the mouth of the river Mississippi.

For a considerable period, right up to the commencement of the present war, New Orleans justifiably claimed to occupy the rank of second most important sea gateway on the North American Continent, its shipping and trade records being surpassed by New York alone, and though, in the absence of reliable official figures, the influence of war-time conditions cannot be estimated with any exactitude, there is every reason to believe that this leading position in the waterborne commerce of the United States is being maintained. In 1940, the last year for which official figures are available for publication, the valuation of cargo tonnage passing through the port was over 325 million dollars.

The port and its activities have been frequently noticed in the columns of this Journal, and, as recently as June, 1942, there was published a detailed account of the present accommodation and commerce of the port in an article by Mr. Scott Wilson. Apart from the normal characteristics of an extensive river-side frontage, there are two unusually outstanding features: one, at present existing, and the other an impending development which seems bound to materialise in the near future. The first is the Inner Harbour Navigation Canal (also called the Industrial Canal from its riparian installations) which traverses the city and connects the Mississippi with Lake Pontchartrain and Lake Borgne, an arm of the Gulf of Mexico, thus providing another route of access from open water, the Mississippi being a notoriously troublesome channel to maintain. This alternative route, however, is somewhat tortuous and presents navigational difficulties which it is proposed to overcome by the adoption of the second feature, known as the Alexander Seaway, which will provide a shorter, more direct and more convenient connection with the Gulf of Mexico. It was described in our issue of July, 1943, and a map of the route was given in November

last. There is considerable local support for the project, which is linked with the name of a former President of the Board of Harbour Commissioners, Colonel Lester Alexander, to whose persistent and active advocacy it owes the measure of popularity which it enjoys and which will eventually ensure its realisation.

British Ports and the Coasting Trade.

Certain remarks made by Mr. W. J. Everard in his recent presidential address at the annual meeting of the British Motor and Sailing Ship Owners' Association serve to draw attention to the special interest of coastwise shipping operators in the administration and the development of British ports. Coastwise shipping inevitably depends for its trade upon the ports which it serves and the two are inextricably bound together in a partnership of interest and purpose. Port policy should, obviously therefore, not be limited to meeting the requirements of big liners and of overseas commerce on a large scale, but should no less take into account the more modest needs of the smaller vessels, which, if they do not loom so prominently in size and importance, are certainly a numerous class, much more frequent in their visits and in the payment of harbour and port dues. Mr. Everard urged that port authorities should provide "so far as trade warrants, such physical improvements in their facilities as may be necessary to meet the needs of coastwise shipping, if full advantage is to be taken of the determination of coasting owners, by the provision of up-to-date ships and efficient working arrangements to maintain and develop coastwise shipping." And he added the obvious truism: "Quick despatch of vessels is a most important factor in the provision of economical water carriage."

Based on these statements of general principle, we do not think that any of our readers will be disposed to take exception to Mr. Everard's plea for a fuller recognition of the value of the coasting trade, which he reinforced by exemplification of one of its many important services. "It must not be overlooked," he said, "that the coaster plays an important part in the distribution of our greatly increased home-produced food and feeding-stuffs. It is a great advantage to the farmers to have their fertilisers delivered to, and their produce collected from, a port in the immediate locality. This, in itself, affords an illustration of the need for maintaining the small ports which will help British agriculture, and which in the coasting owners'

Editorial Comments—continued

interest should be fostered." "Many of the smaller ports," he added, "have needed modernising for a long time, though," he went on to say, "I realise that little, if anything, can be done in this direction during the war." He also expressed the hope that, if it is the Government's intention, as adumbrated in a recent official pronouncement, to give financial support for new motor-ways after the war, this would not imply their intention to show preference to any one particular form of transport. It would, he contended, "seem only fair to assist financially all those ports which have not been able to effect repairs or dredging during the war period." In this view, the authorities at the smaller ports will heartily concur, and we feel that an expression of sympathy with them is due for their long and creditable struggle against adverse circumstances. They are rendering a great and effective service to the country, and their unremitting endeavours to maintain themselves in a reasonably efficient condition, despite a greatly attenuated income, should command some solicitude on the part of the Government.

Port Control.

Mr. Everard had also some pertinent observations to make on a subject which is engaging the earnest attention of port authorities, as well as the Government, viz.: the re-organisation of ports under centralised or locally combined control—what is commonly known as "Grouping." He said he assumed the proposal for the grouping of ports in areas under one authority emanated from those connected with the larger ports and he saw real dangers in such a step "unless it is done with a view to fostering the small ports." We doubt very much whether this consideration is altogether prominently in the minds of the proponents of the idea, there being no reason why the question should not be approached with complete impartiality and solely in the national interest. However that may be, Mr. Everard saw fit to quote a passage from a paper which he read in 1937 on "Norwich and its Shipping," deeming it still apposite and applicable to present conditions. Here it is:

"Broadly speaking, the major part of the revenue of the large ports is derived from goods which pass over the quays; the cargoes which are transhipped overside from the ocean-going ship to the coasting vessel do not receive the same facilities from the Port Authority, and quite properly do not contribute to the same extent as the cargo which is landed on the quay. In these circumstances, a central authority would tend to give more consideration to what can be termed the 'direct' rather than the 'transshipment' trade. Further, if the small ports under a system of port grouping were called upon to pay even a relatively small proportion of the running and executive costs which are necessary in the administration of a large port, it might have very harmful effects on the coastal service. Any general adoption of this principle would, to my mind, be more likely to bring about the death of many of the small ports than their development, which, as I have suggested, is of such vital national importance. The effect would be the loading up of more traffic on the roads and the removal of any possibility there might exist for developing the areas surrounding these small ports."

This, of course, is one side of the question, which has several aspects. We are tempted to enlarge upon the theme of "port grouping," but it is too complex for treatment in this brief comment, so, deferring our observations till a later date, when proposals may have taken concrete shape, we leave our readers to ponder over and digest the opinions expressed by Mr. Everard.

Fires in Dock Areas.

Reference has been made more than once in these columns to the hazards of an outbreak of fire at the quayside and the potential disastrous effects of its occurrence; so that it is not surprising that the importance of fire prevention measures should have been emphasized in a recent official circular from the Shipping Diversion Board. It calls the attention of dock authorities, and indeed, of all transport organisations, to the far reaching effects of any obstruction or delay in the smooth

working and flow of goods in transit during the war period, when every moment of time is of supreme value to the country's war effort. The chief object of the authorities is to eliminate idle time and to utilise every working hour to meet the enormous demands made by the swollen streams of traffic, for which there are fewer ships, railway wagons, road vehicles and canal barges than would have been needed for adequate handling, according to peace time standards. One and a quarter million tons of freight have to be moved in Britain every day of the year and arrangements for its expeditious despatch require the most careful forethought and preparation. "But," adds the circular, "the one thing that could not be foreseen was the unexpected fire, big or little, which could hold up the unloading of a ship, the despatch of a goods train or a road convoy and cause delays that inevitably had a snowball effect by jamming rail routes, causing traffic blockages and eventually factory hold-ups through shortage of materials. . . . Many hours of transport time have been lost through route diversions which had to be carried out. . . . Every port, in consequence, has had to tighten up its fire precautions. One of the largest in Britain has an entire section of the N.F.S., including its own equipped stations, on duty night and day at the docks. The members, when certain classes of ships dock, live in them until the last ounce of cargo has been removed. Nothing can be unloaded without this supervision."

Such is the picture presented for information and study. All port officials conversant with the disastrous effects of a quayside fire will agree that incessant vigilance is the only safe policy.

Proposed Inland Transport Board.

A scheme has recently been outlined by Major-General G. S. Szlumper, C.B.E., M.Inst.C.E., Director General of Supply Services at the Ministry of Supply, formerly General Manager of the Southern Railway, and at one time Docks and Marine Manager at Southampton, for the creation of a Central Control Board to supervise the operation of all Road, Rail, Canal and internal Air services throughout the country.

With the greater part of the scheme our readers will not be particularly concerned, the main exception being as regards canal traffic. Ports and Coastwise Shipping are specifically excluded from the scheme. It may be interesting to give the following summary in General Szlumper's words of the scope and intention of his scheme:—

"My idea would be that rail, road (both passenger and goods), canal, and internal air services should all be brought under a central control, and their revenues and expenditures brought into a common account—for I am very sure that the appropriate and efficient use of each form of transport is only attainable if it is a matter of financial unconcern who actually carries the traffic, and this can only be achieved by making all forms of transport directly interested in the whole of the financial results of carrying the whole of the public traffic of the country."

As regards Ports, General Szlumper excluded them from the scheme because, he said, they are only the transfer points from one form of conveyance to another, and have interests on the seaward side as well as on the landward side. Similarly, coastwise shipping has strong ocean-going interests, as well as the coastwise interests that are competitive with inland transport. At the same time he hoped to see both ports and coastwise shipping setting up central bodies to meet their requirements, and to form strong co-ordinating links between these central bodies and the inland transport central body.

It will be noted that General Szlumper's scheme differs in an essential respect from that propounded by Mr. B. D. Richards in a recent address to the Institution of Civil Engineers, which was set out in our December issue. That scheme proposed to include coastal shipping ports within its purview, and we pointed out that the exclusion would be of an artificial nature and very complicated, because coastal shipping is linked up essentially with ocean-going shipping in the matter of transshipment. The point calls for really careful consideration in the light of Mr. Everard's observations quoted in a preceding comment.

The Great Mississippi Port of New Orleans

Its Trade and Future Prospects

J. A. McNIVEN,

Chief Engineer to the Board of Commissioners of the Port of New Orleans.*

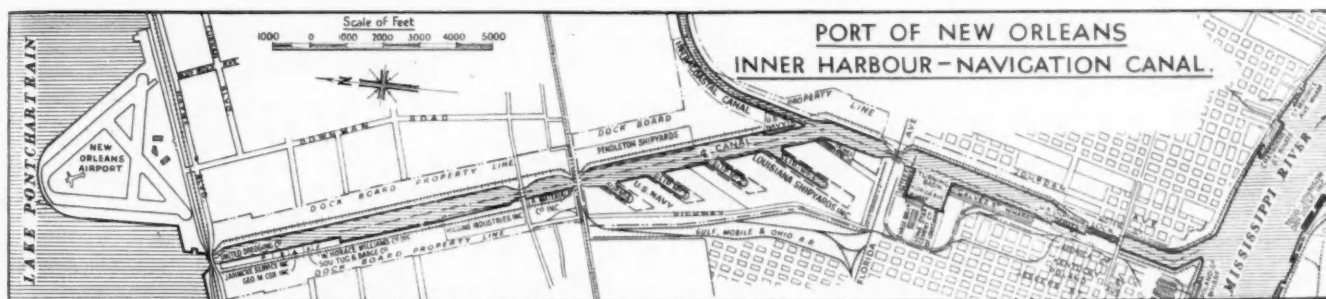
Early Louisiana Settlements.

HISTORY relates that the two LeMoynes brothers, known by their French titles, Sieur d'Iberville and Sieur de Bienville, of French Canadian birth, in the service of their mother country, France, established several permanent settlements along the coast of the Gulf of Mexico early in the eighteenth century, and in the spring of 1718 founded New Orleans, which was designed by them to be the hub of operations for the French possessions in the newly named Louisiana, which, at that time, included practically the entire Mississippi Valley. This territory was possessed successively by France and Spain, and again by France, until Napoleon, fearing that his most powerful enemy, England, would get control of these possessions, sold them to the United States. The Cabildo, where this historic transfer took place, is still one of the treasured mementoes of the colourful background of this romantic city.

Entrance to the Port from the Gulf of Mexico is by way of the Mississippi River, the depth of which is always in excess of 35-ft. throughout the 110 miles to New Orleans. In some locations the depth of the River is as much as 200-ft. The present port limits as defined by law, include a river frontage of 51.4 miles and an Industrial Canal frontage of 11 miles. The river has a minimum width of 2,000-ft. within the port limits, and the depths alongside the wharves range from 30 to 60-ft. The water in the river is fresh at all seasons, and while ocean tides do not affect the river elevation, there is a rise during high water periods, sometimes to a height of 20-ft. above low water, depending upon the flow from the 28 states drained through this waterway.

Organisation.

The Board of Commissioners of the Port of New Orleans, as constituted under the present State law, is composed of five members, serving as a civic duty, without compensation. They are



The act of Congress admitting the present State of Louisiana into the Union, recognized the previous rights of public control of harbours, and the State so exercised this right by actual public administration of the wharves in New Orleans, until financial difficulties following the Civil War caused the Municipality of New Orleans, the State's then administrator of the harbour facilities, to enter into successive contracts with private firms to operate the wharves. This practice continued until 1896, when the Board of Commissioners of the Port of New Orleans, as an agency of the State of Louisiana, was created by Act of the State Legislature.

Progress of Port in the 20th Century.

The Board of Commissioners assumed full control of the publicly owned facilities in May 1901; and, under the Board's continuous administration since then, the Port has kept pace with the rapidly expanding requirements of commerce, and has maintained its rank as one of the foremost ports of the world. Many steamship lines, whose services radiate to every part of the maritime world, have their terminus here. It is also the terminus for barge navigation on the Mississippi River and its many tributaries throughout the vast area from the Gulf of Mexico almost to the Canadian border, and from the Appalachian Range on the east to the Rocky Mountains on the west. It is the terminus for ten trunk railroad lines converging here from the north, east and west. It is the terminus for numerous truck lines, and for many barge lines operating through the Intracoastal Canal route between Corpus Christi, Texas and Apalachicola, Florida. These inland waterways, railroads, and truck lines serve the richest producing areas of the United States.

appointed to overlapping terms of five years each by the Governor of the State of Louisiana. Vacancies are filled from recommendations made by the following five civic and commercial organisations: The New Orleans Association of Commerce, the New Orleans Board of Trade, the New Orleans Clearing House Association, the New Orleans Cotton Exchange and the New Orleans Steamship Association. Each of these organisations has the privilege of submitting the names of two nominees; and from the ten names thus submitted, the Board itself makes a selection of three, and it is mandatory on the Governor to appoint one of these three to fill the vacancy on the Board. This method of appointment was provided by the Constitutional Amendment adopted in 1940 for the purpose of making the Board of Commissioners an entirely independent and non-political body.

The Board, in turn, employs a General Manager, who is responsible to it for the conduct of the affairs of the Port. Under the direction of the General Manager, the various functions of the Board are performed by five major departments, namely:—Legal, Accounting, Engineering, Docks and Grain Elevator Departments.

Port Facilities of the Board.

Since the Board assumed control of the public wharves in 1901, it has provided 7 miles of wharves, 5½ miles of which are covered with modern steel sheds; a terminal grain elevator, having a storage capacity of 2,600,000 bushels; a cotton warehouse, having a storage capacity of 461,856 high density bales; two special banana unloading wharves, equipped with 12 mechanical banana unloaders having a total unloading capacity of 26,400 stems per hour; a two-storey green coffee wharf, having a storage capacity of approximately 185,000 bags of coffee; and many subsidiary

*Paper presented at the Thirty-Second Annual Convention of The American Association of Port Authorities at New Orleans, October, 1943.

Great Mississippi Port of New Orleans—continued

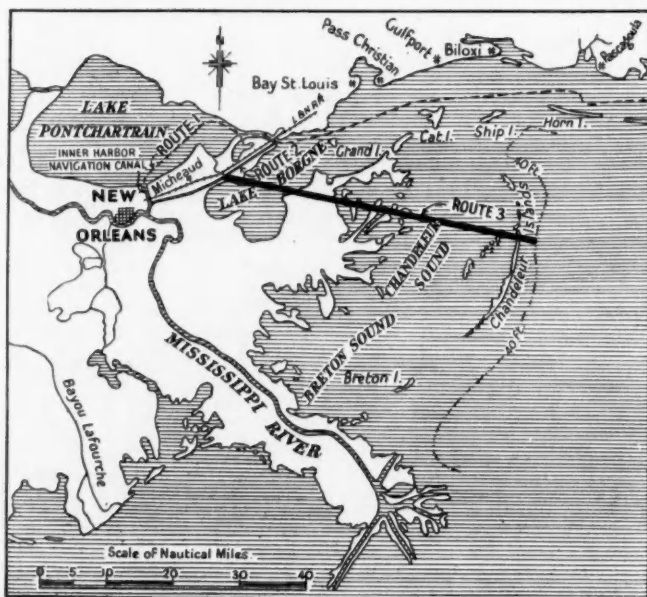
and auxiliary facilities. The value of these properties is approximately \$27,240,000, exclusive of land values.

These facilities are open to shippers using this port, on terms equal to all. They are served by the New Orleans Public Belt Railroad, a municipally owned railroad, which has interchange connection with all the trunk railroad lines and co-ordinates the railroad and steam ship services with those of the port facilities.

In addition to its riverfront properties, the Board constructed during the last war the Inner Harbour-Navigation Canal, which connects the Mississippi River with Lake Pontchartrain, an arm of the Gulf of Mexico. This Canal, as shown on the plan on this page, is some 5½ miles in length and 30-ft. deep, and is being dredged, from time to time, to a channel width of about 500-ft. The river elevation, generally, is higher than the lake level, thereby necessitating the use of a lock. This lock, designed by General George W. Goethals, builder of the Panama Canal, is near the river end of the Canal, has a usable length of 640-ft., is 75-ft. wide, and the minimum depth of water over the sill of the lock is 31.5-ft. below Mean Gulf Level. The total cost of the Canal construction, including the cost of land, lock and bridges, was approximately \$19,200,000. This Canal provides space for future expansion of the Board's commercial wharf system, and for industries requiring water frontage with constant water level. Slips and piers can be constructed as required, and any depth of water necessary for vessels can be provided alongside same or at berths along the Canal banks. Industries located on this Canal have the further advantage of being close to the facilities of the Port and the City. This Canal is now a link in the Intracoastal Canal System, and negotiations are about to be completed whereby the Lock, the Forebay and a portion of the Canal will be leased to the United States Government, so that thereafter there will be no charge for passing through the lock, which will be operated on a 24 hour basis.

The Alexander Seaway.

In addition, the Board is sponsoring the construction by the United States Government of the "Alexander Seaway," a sea-level channel to extend from the Board's Inner-Harbour Navigation Canal to the Gulf of Mexico, of sufficient width and depth to permit the largest ships afloat to enter the Port. A plan of the



proposed seaway accompanies this article. Along the banks of this channel would be almost unlimited areas for slips and laterals, on which could be constructed additional wharves, piers, docks, industrial plants, drydock and ship repair plants, etc., as future development may warrant, all having the advantages of deep

water frontage, constant water level, and a short, safe route to the sea.

Constructional Features.

A noteworthy characteristic of the Port is the extensive longitudinal wharf system on the east bank or New Orleans side of the river, where the wharves form almost a continuous quay for nearly 9 miles. The excessive depth of the river at short distances from the bank makes it impracticable to build piers into the Mississippi River for ocean going vessels. Slips dredged into the banks of the river would not only require extensive and expensive levee construction, but would be difficult to maintain because of shoaling that would result from the deposit of silt during high-water periods. These conditions, therefore, restrict the construction of the wharves along the river to the quay type. (The river front layout was shown in the issue of May 1943.)

Along certain stretches of the river, particularly near the downstream end of curves, the banks are subjected to scouring, while at other locations shoaling occurs during high-water periods. These conditions, either the scouring action or the excessive silt deposit, if not controlled, would produce bank movements that would endanger the wharves as well as the levees protecting the city from high water. Therefore, in the design and construction of facilities on the river banks, very careful consideration has to be given to the many factors involved, so as to provide construction that will not produce bank scouring or excessive deposit. It is also very essential that the banks be maintained, within close limits, to their normal stable slopes. To insure this, periodical soundings are taken along the front of and underneath the wharves and whenever excessive sedimentation is noted, it is removed from in front of the wharves by hydraulic dredging, and from beneath the wharves by washing down the banks with hose lines from tugs or with the tug's propeller. Where scouring occurs, mattress protection has to be provided.

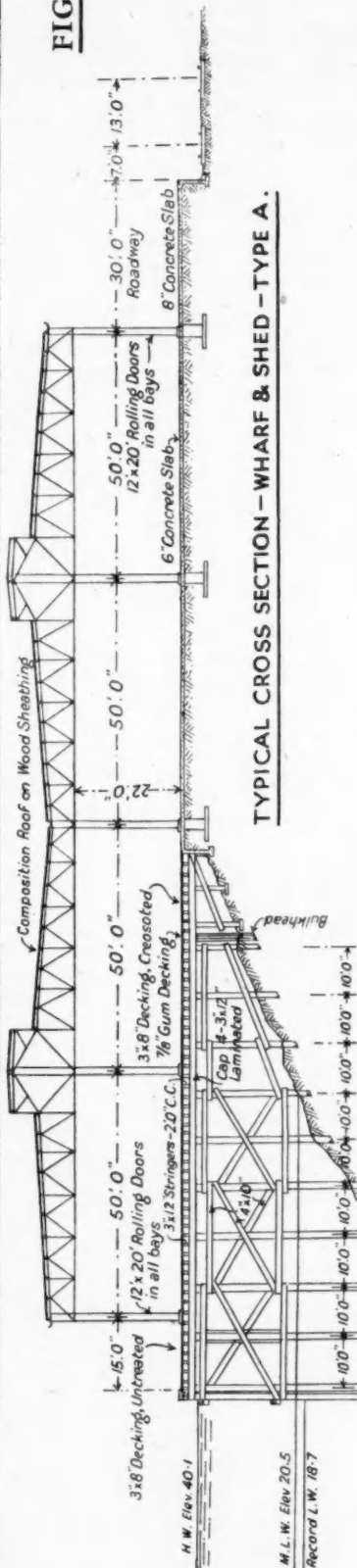
The wharves along the riverfront, in general, range from 150-ft. to 250-ft. in width, including the front apron, 12-ft. to 20-ft. wide, and the standard 30-ft. roadway in the rear. A wharf of the latter width is preferred, as such width is needed, generally, to hold the cargo of a present-day freighter, within its own length.

Usually, about one-half of the wharf structure is built on top of the river levee, and the other half is built on the riverside slope. In some cases, however, where the bank slope is steep, which requires that the levee be set back on solid ground so as not to overload the bank and cause it to move, the wharves are built entirely in front of the levee, with the roadways only being placed on the levee crown.

The usual practice in constructing the part of the wharf structure on the levee, is to build a chain wall along the riverside of the levee and another chain wall at the landside of the rear roadway. The space between these walls is then filled with river sand, which is compacted by wetting and rolling; and a concrete floor slab is then constructed on the fill. The part of the wharf structure that is on the riverside of the levee, in the majority of wharves, is of pile and timber construction. The piles range from 85-ft. in length at the front to 60-ft. at the rear of the wharf, and are braced longitudinally and transversely, as necessary. The wharf deck is of usual construction, with timber caps on the piles, timber floor stringers on the caps, with either a wooden or a concrete floor over the stringers. The piles and timbers in most of these wharves are treated with creosote, but on several wharves, bracing, caps, and floor timbers, treated with Zinc Meta Arsenite or Wolman Salts, have been used, these latter treatments being considered to be fire-retardant. The allowable loading on these wharves is 250-lbs. per square foot on the timber portion, and 500-lbs. per square foot on the levee portion. The transit sheds on these wharves are of steel frame construction, enclosed with corrugated iron siding and steel rolling doors, and covered with a built-up roof of five-ply construction, with either tar and gravel or asphalt and gravel surfacing, laid on wood sheathing. (See fig. 1).

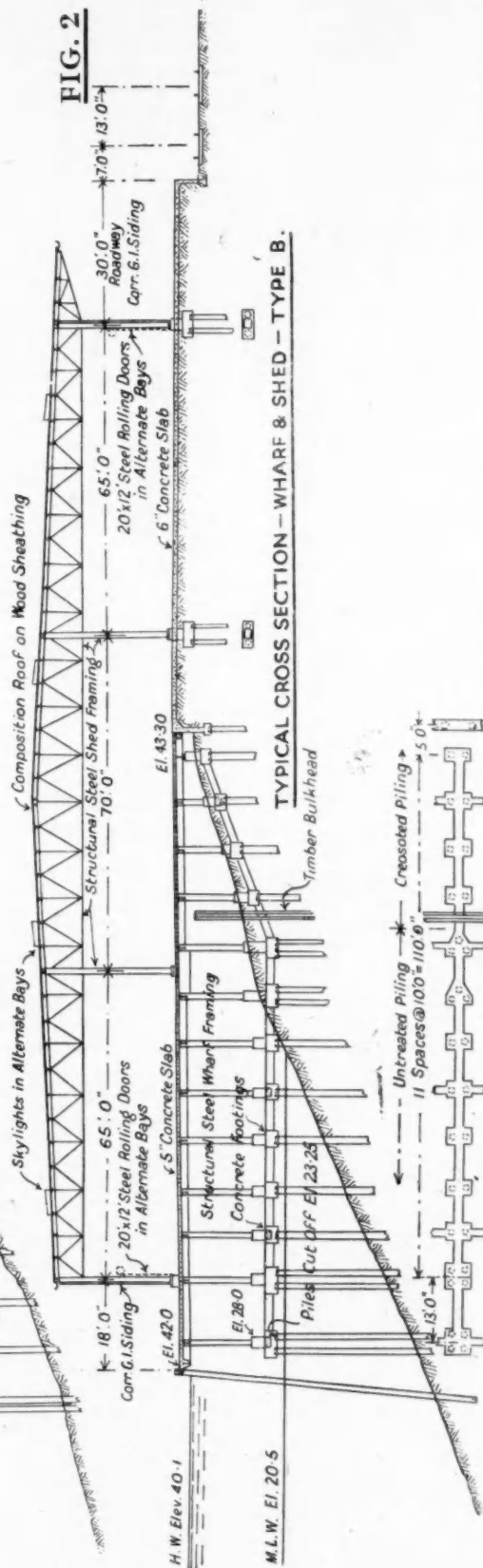
In the more recently built wharves, the portions in front of the levee are of non-combustible construction. This type of construction consists of wooden piles capped with reinforced concrete footings, the footings being tied together longitudinally and later-

FIG. 1



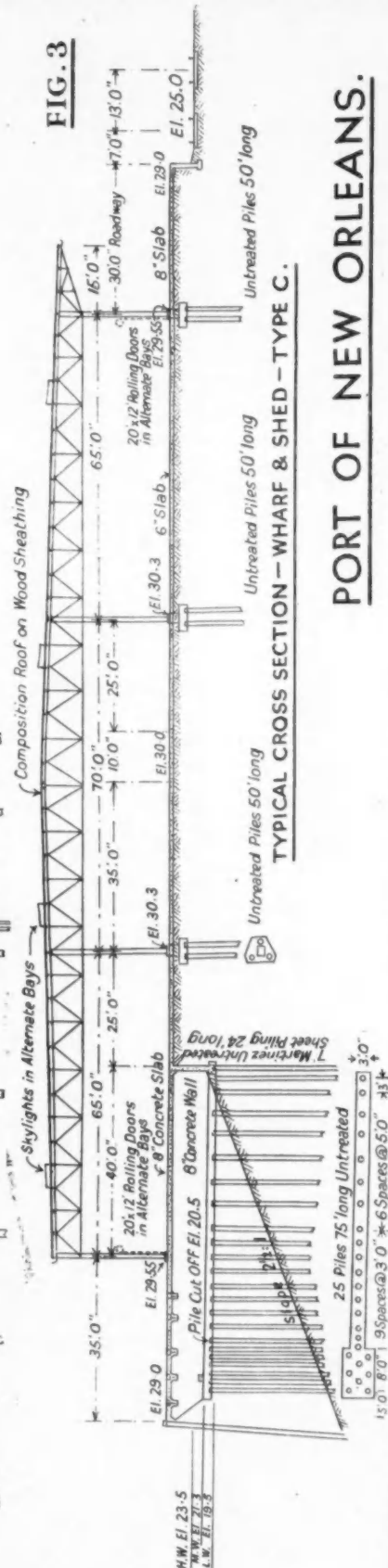
TYPICAL CROSS SECTION - WHARF & SHED - TYPE A.

FIG. 2



TYPICAL CROSS SECTION - WHARF & SHED - TYPE B.

FIG. 3



TYPICAL CROSS SECTION - WHARF & SHED - TYPE C.

PORT OF NEW ORLEANS.

Great Mississippi Port of New Orleans—continued

ally with concrete struts. (See fig. 2). Treated piles are used beneath the footings constructed above low water level, as on the bank slope, and untreated piles are used beneath footings constructed at low water level. Structural steel framework extends from the footings to the under side of the wharf floor level and is covered with a reinforced concrete floor. The use of this type of construction, however, is limited to locations where the river bank is considered to be stable. The levee portion of these wharves and the transit sheds are of similar construction to that described above and shown on fig. 1. These wharves will support a floor load of 500-lbs. per square foot on the levee section, and from 300-lbs. to 350-lbs. per square foot on the river portion.

The roadways serving the river front wharves are, in some instances, inside of the shed, but on all of the newer structures, constituting about 85 per cent of the wharf facilities, the roadways are on the rear of the wharf and outside of the shed. Certain of the advantages of the rear roadway are that all of the space within the shed can be used for the storage of cargo, including the space that would be occupied by a roadway were it inside the shed; promiscuous traffic is kept outside the shed, thereby decreasing the possibility and likelihood of pilferage, as only persons having business within the limits of particular assignments need be allowed within the sheds; and the shippers have safer, cleaner and more private assignments, and greater opportunity for the more efficient assembling of cargo and use of mechanical equipment.

The tracks of the Public Belt Railroad are located along the rear of all wharves, and shipside tracks are also provided on wharves where such services are required.

The 2,400-ft. wharf on the Industrial Canal is of the type shown on fig. 3. This wharf consists of a concrete apron structure in front of the levee, 75-ft. wide and supported on untreated wooden piles cut off at low water. The levee portion of the wharf and the transit shed are similar in construction to that shown in fig. 2.

An idea of the extent of the wharf system administered by the Board of Commissioners may be obtained from the following figures:

Wharf frontage	...	...	...	37,759 lin. ft.
Shed frontage	...	...	...	28,565 " "
Covered wharf area	...	...	...	5,010,828 sq. ft.
Uncovered wharf area	...	...	...	1,956,012 " "
Total wharf area	...	...	...	6,966,840 " "

Some of the major items of maintenance involved in the wharves, are:

Wharf piles (timber)	...	...	...	88,940
Structural steel	...	...	...	23,407 tons
Sheetmetal siding	...	...	...	1,204,400 sq. ft.
Steel rolling doors	...	...	...	2,183
Roofing	...	...	...	4,932,200 sq. ft.
Sprinkler piping	...	...	...	303 miles

Fire Prevention.

During the ten year period ending in 1930, the Port suffered heavily from the loss of several wharves due to fire, totalling approximately ten million dollars. During this period, the protection against fire was being improved by the construction of a number of full height fire walls at various intervals throughout the wharf system, and studies were made of every known fire protective device in use at that time. All, however, were found to be inadequate with the possible exception of automatic sprinklers, and there was considerable doubt as to the effectiveness of sprinklers, due to the large open areas under the wharves and the height of the sheds making the operation of the sprinkler heads doubtful; to say nothing of the expense involved in installing an adequate sprinkler system to protect the large expanse of combustible wharves and sheds constantly exposed to fire hazard.

However, in 1930, the problem of fire protection became so acute that a further and more intensive study was made regarding the use of automatic sprinklers, and it was decided that, by the addition of fire stops below the wharf deck between fire walls, and of draft-stops in the sheds at proper intervals, a sprinkler installation would probably give the best protection possible. In

the early part of 1931, work was commenced on the installation of sprinklers in all wharves and sheds, and was completed in September 1931. At that time a contract was also let for a complete valve supervisory system, and this installation was completed in December 1931. By January 1, 1932, all wharves and sheds were completely protected with a supervised automatic sprinkler system and, although we have had nine fires in sheds and substructures since that time, an eleven year period, the total losses from those fires were less than the cost of a medium priced automobile.

As previously stated, the majority of the wharves on the riverfront are of the semi-combustible type, since the riverside or front portion of the wharf is of pile and timber construction. These wharves are, of course, very inflammable, not only in themselves but because of the gases exuding from the creosoted piles and timbers when subjected to high temperature. Therefore, for protection against fire, the wharves along the riverfront are divided into 26 fire areas, and those on the Inner Harbour-Navigation Canal are divided into 4 fire areas, making a total of 30 fire areas for all of the wharves. These fire areas are protected, on one or both ends, by concrete fire-walls or open areas between wharves, the fire-walls being approximately 1,000-ft. apart. Underneath the wharves, each fire area is further divided by 4-in. thick wooden fire-stops, most of which have the protection of 2-inches of "Gunite" concrete, extending the full width of the timber portion of the wharf and from the deck line to within a few feet of mean low water. These additional fire-stops are located so that the number of heads that can be activated in one fire will not exceed the number that can be opened without material reduction in water pressure in the pipe lines. Also, above deck on covered wharves, draft stops of corrugated iron are provided, extending from the under side of the roof sheathing to a few inches below the roof trusses of the sheds, between each two wet systems, totalling about 800 heads.

The entire sprinkler installation is divided into 184 wet systems, which are of the standard automatic type, except that quartz-bulb-type heads are used instead of the usual solder type. The quartz heads fuse at 135 degrees Fahrenheit. In addition to these wet systems, "Deluge" equipment, operated by Heat Actuated Devices, is provided at each wooden fire-stop underneath the wharves. These "Deluge" systems produce water curtains on both sides of the wooden fire-stops in the event of fire under the wharves. They are, in general, 4-inch systems which connect to open heads on each side of the fire-stops with the heads spaced about 5-ft. apart. These systems are tripped by means of Heat Actuated Devices spaced not more than 15-ft. upstream and downstream from each fire-stop, and spaced not more than 35-ft. apart along the fire-stops. Upon being subjected to a temperature rise of 15 degrees Fahrenheit in the period of one minute, the device transmits an air column movement to the release located in the "Deluge" equipment, resulting in a flow of water to the open heads on both sides of the fire-stop at the rate of from 20 to 35 gallons per minute per head, and producing a water-spray curtain to prevent the spread of hot gasses past the fire-stop. The "Deluge" equipment can also be operated manually and made to function far ahead of any fire which may start some distance away from the fire-stop. This sprinkler and "Deluge" installation cost approximately one and one-half (1½) millions of dollars.

Standpipe systems are also provided in the sheds on all wharves, consisting of approximately 600 outlets, with one 50-ft. length of 1½-in. fire hose attached to each outlet. These outlets are spaced within about 80-ft. of each other, so that the intervening areas can be readily reached by hose lines in case of fire.

For the sprinkler and standpipe systems, water is obtained from 12-inch mains laid along the landside of the wharves. The sprinkler systems are also equipped with standard pumper connections for the maintenance of high water pressure in the lines.

All concrete fire walls are equipped with fire doors on each side. These doors are equipped with Heat Actuated Devices which operate release trips to cause the doors to close when a 15 degree Fahrenheit rise of temperature in one minute occurs. Also, the holding rope on each door is equipped with a fusible solder link at the door connection, so that heat through the door opening will release the door through the fusing of the link.

Great Mississippi Port of New Orleans—continued

The wharves are also protected by 20 Master City Fire Alarm boxes, 4 Star boxes, and 34 auxiliary boxes to the Master boxes. In addition, there are 83 American District Telegraph alarms on the wharves. Whenever a city alarm or an American District Telegraph alarm is pulled, the alarm is transmitted to the New Orleans Fire Department as well as to the Harbour Patrol office of the Board and to the Board's fire tug stations, so that all available fire fighting apparatus gets the alarm simultaneously.

In addition, 187 wet-system sprinkler valves, 54 "Deluge" valves, 71 city connection valves, 58 Sewerage and Water Board valves to these city connections, and 6 sectional valves in the bulkheads in the sheds, are supervised by the American District Telegraph Company, making a total of 376 valves that are supervised. In the event that a valve is closed, partly closed, or even merely tampered with, a valve closure signal will be transmitted to the American District Telegraph office, and the signal cannot be cleared until the valve has been reset. The American District Telegraph office notifies the Board's Harbour Patrol office immediately of any such happening and sends a man to investigate the matter and reset the valve.

To indicate the extent of the sprinkler system and other fire prevention facilities, the following may be of interest:

Wharves:

Number of sprinkler heads in sheds ...	66,560
Number of sprinkler heads under wharves ...	45,280
Total number of sprinkler heads	111,840
Number of miles of pipe in sprinkler systems only ...	270 miles
Number of "Deluge" systems ...	54
Number of draft stops in sheds ...	63
Number of fire stops under wharf decks ...	52
Number of fire stops above wharf decks ...	2
Number of concrete fire walls ...	17
Number of fire areas ...	30
American District Telegraph boxes on wharves ...	83
Supervised valves ...	376
Standpipe outlets on wharves ...	596

Public Cotton Warehouse.

Number of sprinkler heads in plant and wharf-house ...	18,000
Number of sprinkler heads under wharfhouse apron and at Sacking Plant ...	4,000
Number of fire-stops under wharf and at Sacking Plant ...	4
Number of "Deluge" systems under wharf and at Sacking Plant ...	4
Miles of pipe (approx.) ...	33

The National Fire Protection Association, in its December, 1942, *News Letter*, has this to say:

"The value of sprinkler protection for combustible pier sub-structure has previously been demonstrated in New Orleans, where the previous annual average loss of over a million dollars in waterfront properties has been reduced to practically zero following the installation of sprinklers in and under some miles of New Orleans wharves."

The Board also operates two fire-tugs, the *Samson* and the *Deluge*, which answer all distress and fire calls within the Port limits. The *Deluge* is a steel hull vessel, 138-ft. 8-in. in length, and carries 4 fire pumps having a capacity of 2,600 gallons of water per minute each, or a total capacity of 10,400 gallons per minute. The *Samson* is also a steel hull vessel, 108-ft. in length, and has a pumping capacity of 1,000 gallons per minute. Each vessel is equipped with a Foamite plant for use in fighting oil fires, and is also equipped with a short wave radio for two-way communication with the Board's Harbour Patrol office.

For police protection, the Board maintains a Harbour Patrol Department, which now numbers 151 Officers and men. Approximately 75 of this number are uniformed police officers, who are assigned patrol beats along the wharves of the Port. The work of

these men is supplemented, during war times, by approximately 75 guards, who maintain a 24-hour watch over all entrances to wharf sheds. The work of these men is supervised by Corporals and Sergeants of the Harbour Patrol cruising the waterfront 24 hours a day. The Patrolmen have the same police powers as sheriffs of the State of Louisiana, and are specially trained to be on the alert for sabotage, espionage, fire, etc., on the wharves and to cope with these situations, if and when they arise. In addition to their regular police duties, these Patrolmen record the time of arrival and departure of vessels, and, for the period of the war, they are also charged with the responsibility of enforcing the emergency war ordinances enacted by the Board at the request of the United States Coast Guard and other Federal agencies.

The Port of New Orleans was one of the first to install a photo-badge system and, since the beginning of the war, all persons seeking admission to any wharf under the administration of this Board have been required to have a photo-badge issued by the Pass Department. To obtain a photo-badge, it is necessary for an applicant to be vouched for by his employer, and to be finger printed, and also to have a United States Coast Guard identification card. All applicants are investigated locally by the Division of Investigation of the Harbour Patrol Department and, in addition, their finger prints are forwarded to the Federal Bureau of Investigation in Washington. Any dangerous or suspicious character revealed by these investigations is excluded from all waterfront property.

In general, the facilities of the Port are of the most modern type, particularly the publicly owned wharves, of which about 85 per cent have been newly built or rebuilt since the last war. During the present war emergency these facilities are, of course, being used extensively for various purposes in connection with the war effort, the details of which cannot be given for obvious reasons.

A port like New Orleans is a place of interchange between inland and ocean carriers. It serves not only the local community and its immediately adjacent territory but, beyond that, a vast hinterland in competition with other ports. When you think of the quick and efficient interchange which must occur between the rail and inland water carriers and the ocean carriers, and when you consider that all of this must be done while providing convenient and orderly access to the wharves for local warehousemen, distributors and industries, then the importance of adequate modern facilities, of their efficient operation and of the co-ordination of all interests involved, is manifest. These requisites, we believe, are successfully met in this Port under the administration of the Board of Commissioners of the Port of New Orleans.

Scottish Harbour Finances

Mr. Robert Boothby, M.P. for Aberdeen, has been interesting himself in the harbour debts of North-east Scottish ports and announces that he intends to take an early opportunity of asking for a categorical statement by the Government that it is prepared to cancel harbour debts in cases where repayment has been proved impossible because of war conditions.

A considerable amount of interest is being taken in this problem, since it has very wide implications in the north-east Scotland area. Portknockie has proposed that the towns saddled with heavy harbour debts should hold a conference to consider the position collectively. Portknockie has repaid £2,000 of a 5 per cent. £10,000 loan leaving £8,000 still due. In normal cases such obligations were intended to be honoured, but the abnormal conditions have made it impossible for them to continue paying in the way they have been doing.

Peterhead Town Council has offered to pay £3,000 of the amount due to the Public Works Loan Board but this will only go about half-way towards meeting the town's harbour debt. The Peterhead view is that, since the port is not permitted to function for the time being as a fishing port, the town should be relieved of the debt which it incurred to encourage the development of the fishing industry at the port.

Notes of the Month

Bristol Pilotage Service.

Difficulty is being experienced by the Bristol Pilotage Committee in filling vacancies on the staff. They have gone so far as to seek power from the City Council to dispense with certain requirements of the bye-laws in respect of temporary Channel pilots. Certain alterations are also being made in regard to allowances for travelling expenses.

Increased Pay for Dock Workers.

An increase in wages demanded for dock labourers by the Transport and General Workers' Union has been conceded by the Employers to the extent of 1s. per day. About 54,000 men are involved and the estimated cost of the increase is over a million pounds per annum. It will bring the national minimum to 16s. per day for the major ports of the country and to 15s. per day for the smaller ports.

Centenary Celebrations at Danish Ports.

Centenary celebrations have recently been held at two Danish ports, Kolding and Frederikssund. The former came into existence in 1843, with a small harbour basin, 250-ft. long by 180-ft. wide, with 9-ft. of water, connected to the outer fjord by a canal. From time to time, extensions and improvements have been carried out and the length of quayage is now $5\frac{1}{2}$ kilometers. A $2\frac{1}{2}$ -ton crane has recently been installed. The other port, Frederikssund, also founded in 1843, was considerably extended in 1925.

Proposed Seaplane Base at Stornaway.

The provision of facilities for seaplanes at Stornaway Harbour is envisaged in an ambitious programme of post-war developments adopted by the Stornaway Pier and Harbour Commissioners. The programme includes the reconstruction and extension of existing wharves, the construction of additional wharfage, the erection of new warehouses and offices, a new fish mart, a seamen's home, and a welfare centre for seamen and fishermen.

Traffic on the Falsterbo Canal.

The Falsterbo Canal which, within the past few years, has been constructed through the peninsula of that name in the south of Sweden, with the object of enabling Swedish ships to avoid passing through the minefields, laid by the Germans, off the mainland, has proved of great utility and now practically all the traffic passing through the southern part of the Sound makes use of this artificial waterway. No fewer than 8,953 vessels passed through the canal last year, including 2,573 foreign vessels, compared with 5,176 and 1,489 respectively in 1942. Since the canal was opened on August 1st, 1941, 14,463 vessels have used the new route. The question of charging dues to vessels passing through the canal was raised about a year ago, and members of the Swedish Parliament have given notice of their intention to raise it again, but it is believed that no action will be taken until the end of the war.

Dockers and Danger Money.

Mr. Fred Smith, district secretary at Liverpool of the Transport and General Workers' Union, having drawn the attention of the North-West Regional Port Director to various reports which have appeared recently regarding the unloading of Spanish oranges in British ports and to the allegation that Merseyside dock workers had demanded additional payment of danger money on these cargoes, has received a reply from the Director in which the latter states there is no foundation whatsoever in the North-Western ports for the allegation. Cargoes of oranges from Spain have recently been unloaded at the Merseyside and the dock workers neither requested payment of danger money nor received any such payment. The dockers manned the ships without hesitation immediately on arrival in the port and discharged the cargoes expeditiously and efficiently under the ordinary rates and conditions.

Passenger Traffic at Lisbon.

According to statistics published by the Lisbon Harbour Administration, persons departing for overseas from that port last year numbered 19,912, arrivals totalled 23,607, and 2,263 persons passed through Lisbon in transit.

The Institution of Mechanical Engineers.

The sixteenth Thomas Lowe Gray Lecture has recently been delivered to the Institution of Mechanical Engineers by Dr. G. S. Baker, O.B.E., formerly R.C.N.C. His subject was "Fundamentals of the Marine Screw Propeller."

Congestion at Puerto Cabello.

It is reported that there has been considerable congestion of merchandise lately at Puerto-Cabello, Brazil. It has necessitated the Government taking certain action to relieve the pressure on the port, which apparently has proved effective, according to latest reports.

War Distinctions for Members of Port Staffs.

Among war distinctions awarded to members of port staffs are the M.B.E. to Major T. M. Ferguson, of Rangoon Port Authority, and to Major James M. P. Gordon who was engaged with a Port Reconstruction and Repair Company in North Africa and formerly in the office of the Aberdeen Harbour Board.

Official Mayoral Visit to Cardiff Docks.

The Lord Mayor of Cardiff (Alderman Frederick Jones) made an official courtesy visit on February 1st to the Cardiff Docks, where he was received by Mr. H. C. Bolter, president of the Cardiff Chamber of Commerce and the Chairmen of all the local business organisations. The Lord Mayor, in his address, said he had always done his best to keep the port and city closely connected as the combination was bound to result in the good of both.

Manchester Ship Canal Company.

At the ordinary general meeting, on February 28th, of the Manchester Ship Canal Company, the following dividends were recommended by the Directors: $3\frac{1}{4}$ per cent. on the Manchester Ship Canal Corporation Preference stock; 3 per cent. on the Preference shares and $1\frac{1}{2}$ per cent. on the Ordinary shares. Similar payments on the Ordinary shares have been made during the last three years.

Impending Retirement of Harbour Master.

At the recent meeting of the Southampton Harbour Board, Alderman Sir Sidney Kimber announced the retirement at the end of this year of Captain F. W. Frampton, who has served as harbour master for the past 16 years, following his appointment as deputy harbour master 28 years ago. Sir Sydney said that Captain Frampton had done exceedingly fine work during his long period of service, which extended three or four years beyond the normal retiring age of 65. Captain A. E. Bartlett, at present assistant to the harbour master has been appointed deputy harbour master as from January last.

The Proposed Forth-Clyde Canal.

Answering a question in the House of Commons as to when the deliberations of the departmental Committee on the proposal for a canal connecting the Firths of Forth and Clyde would be concluded and its report published, Mr. Noel Baker, Parliamentary Secretary to the Ministry of War Transport, said that he understood that the departmental group, which was now considering the question, were awaiting information which might not be received before the end of February, or even later. He could not, therefore, predict when their deliberations were likely to end. Since questions of national security might be involved, the Minister thought it wiser to make no decision about publication of the report until it was received.

Labour Conditions at the Port of Glasgow

Establishment of First-Aid Centres

On the 29th January, **Mr. Thomas Johnston**, Secretary of State for Scotland formally opened at Port Glasgow six Port Aid Centres, which have been provided by the Clyde Navigation Trust.

In his address Mr. Johnston pointed out that the Clyde had led the way in the installation of these centres, which would be of considerable service in maintaining the activities of the Port without prolonged interruptions.

He had been informed that last year there were no fewer than 8000 accidents, mostly minor, to the employees of the Clyde Dock Commission. Small accidents they might have been, but had they been allowed to develop they would have formed a great mass of preventable suffering and waste of time and energy. The Regional Port Director had assured him that the care taken and developments going forward on Clydeside had almost completely changed the attitude of the industrial population. During last year there had been no industrial dispute leading to a stoppage of work. Canteens had developed, and the provision of baths had, he hoped, been begun. There was a splendid system of first-aid arrangements. All those things he hoped would continue in the post-war years, so that suffering and sorrow which could be prevented would be completely eliminated from the lives of industrial workers.

Mr. Thomas Macpherson Regional Port Director, assured Mr. Johnston that they would all do their best on Clydeside during the remaining stages of the war to give their maximum effort, especially during the next momentous two or three months, when the climax of the war would have arrived. It was a comfort to feel that arising out of the war it had been possible to bring about two notable improvements in the status and conditions of work of the workers employed in the harbour and particularly in the docks. "This war," said Mr. Macpherson, "may well be remembered as the time when casual labour was abolished, I hope for ever, and also when the principle was adopted of the authorities being responsible for the provision of adequate up-to-date facilities at the docks." The seal had now been placed on that latter development, and the Clyde Trust deserved their heartiest congratulations for the first-class job they had done. The Secretary of State and the Minister of War Transport, who sponsored the scheme, might justly be proud of it.

At the luncheon which followed, further reference was made to the improvement of labour conditions at the port.

Mr. William Cuthbert (chairman of the Clyde Trust) said that the abolition of casual labour was an ideal they had had before them for many years during which they had tried to bring it about, but it was not until the outbreak of war that they had succeeded. Another great benefit which had come out of the war was the provision of canteens, a development which he hoped had come to stay. Last year their canteens had served 840,000 meals, an increase on the previous year of 161,000.

Mr. Macpherson said that the aid centres now provided were, he believed, the best of their kind and better than any in any other port in Great Britain. He believed that the silent revolution which was taking place through the recognition of the provision of the best possible conditions for the workers made for better work. Wherever the Government found itself associated with the employment of labour, it was the Government's policy to see that workpeople were as contented and happy as possible. They were convinced that this was a fundamental necessity for good work. "We are talking and thinking in these days about post-war planning," said Mr. Macpherson, "but nothing will attract business and freight to these docks so much as work of good quality."

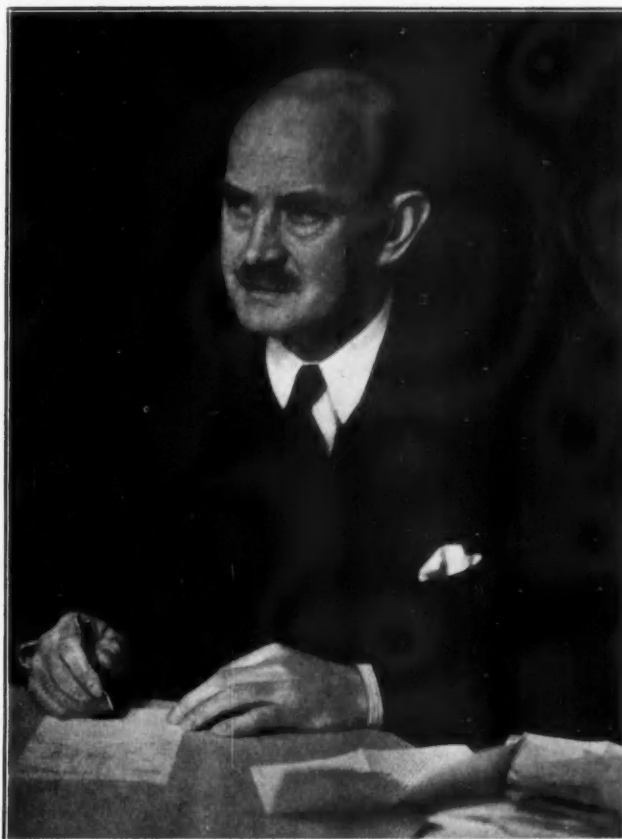
The first port aid centre came into operation last November, and all six have been in use for some time. At each centre there is a sister in charge and the accommodation includes a treatment room containing all necessary medical and surgical equipment, a shock room for the treatment of the more severely injured, a consulting room and a room for the nurses. Since November, 3,267 cases have been treated.

Notable Port Personalities

XL—Sir Ronald T. Garrett

Sir Ronald Thornbury Garrett was born in 1888, the third son of the late Mr. Samuel Garrett, who was President of the Law Society in 1917.

Following education at Rugby, he embarked on a shipping career and joined, in 1912, the firm of Anderson, Green & Company, Limited, Managers of the Orient Line. From 1914-1919, during the last war, he served as Captain in the Royal Army Service Corps.



Sir RONALD T. GARRETT.

He is a Director of Anderson, Green & Company, Limited; a member, since 1934, of the Port of London Authority, also of the Council of the Shipping Federation, of the National Maritime Board, and of the Council of the Chamber of Shipping.

He was representative for London at the Ministry of Shipping, 1940-1941; and has been Chairman of the National Dock Labour Corporation, Ltd., since its inception in 1941; Deputy-Chairman of Lloyd's Register since June, 1943, and Chairman of the National Association of Port Employers since February, 1941.

A Knighthood was conferred upon him in the New Year Honours of this year.

The Institution of Mechanical Engineers.

Dr. Harry R. Ricardo, F.R.S., has been elected President of the Institution of Mechanical Engineers for the year 1944-45.

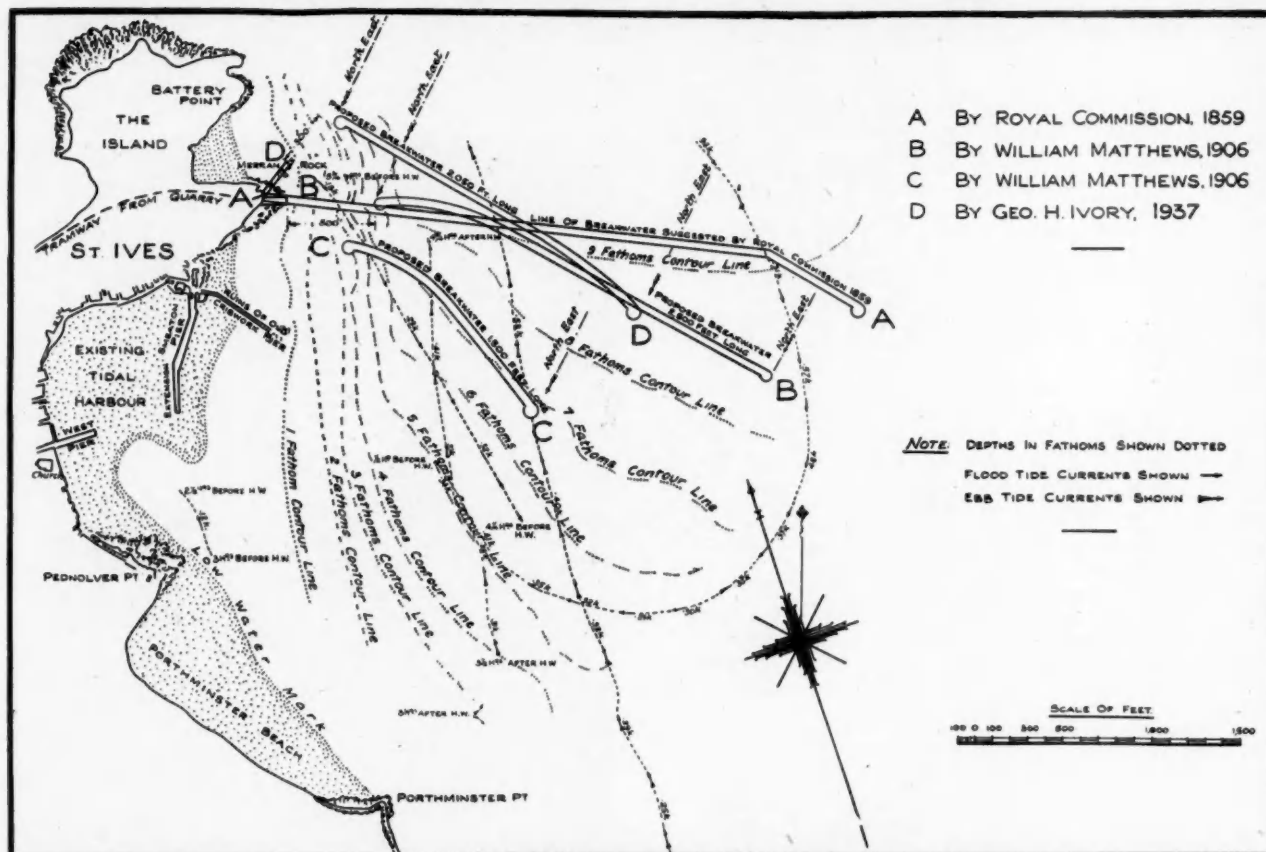
Use of Old Cargo Ships as Port Warehouses.

A proposal has been put forward in the United States for the utilisation of old cargo ships, no longer serviceable for sea service, as "combination docks and warehouses" in devastated ports where such facilities are urgently required.

Proposed Harbour of Refuge at St. Ives

A reference was made in the issue of November last to the revival of the project for a harbour of refuge at St. Ives, on the north coast of Cornwall. Through the courtesy of the *Western Morning News* of Plymouth, we are able to reproduce a plan show-

tramway would form the base for a new promenade around Porthmeor Beach. The spur, at the upper D on plan, would become the loading stage for the new breakwater, and, afterwards, the inner side of it would be adapted as a lifeboat slipway. Mr. Ivory has designed the outlet opening obliquely and only 300-ft. wide, between the spur and the breakwater, to minimise the effect of storms from the sea on shipping at anchor. The opening is



Proposed Sites for Breakwater at St. Ives Harbour.

ing various proposals made for a site for a breakwater at St. Ives, including that recently advanced by Mr. Geo. H. Ivory, of Plymouth. In connection with his project, Mr. Ivory has suggested building the tramway to the spur along the Porthmeor Beach from a quarry to be worked at the other end of it, and to construct the spur on the Merran Rock in the first instance, where there is good foundation. The site of the quarry would, he claims, ultimately make a suitable location for a winter garden. The

in deep water so that sea-borne sand would be allowed free passage and not become banked within the harbour.

The matter has been referred to the Royal National Lifeboat Institution, whose engineers, Messrs. Lewis and Lewis have it under consideration with a view to the preparation of an official design.

In February, 1922, the harbour of St. Ives was the subject of a leading article in this Journal.

The American Association of Port Authorities

Annual Convention

The 32nd Annual Convention of the American Association of Port Authorities was held in New Orleans, Louisiana, on October 19th—22nd, 1943, under the chairmanship of Mr. Mark H. Gates, the retiring President.

In addition to a number of Committee Reports on various matters, Papers were read on "Ports in Wartime," "Post-war Air Trade and Travel," "Public Airport Agencies and the American Association of Port Authorities," "Public Port Policy" and "Pan-American Relations."

At the close of the Convention the following officers were elected for the ensuing twelve months.

President: Mr. Walter P. Hedden, (Port of New York Authority); Vice-Presidents: Messrs. R. T. Spangler, (Fort Lauderdale), Arthur Eldridge, (Los Angeles), and K. J. Burns, (Vancouver). Mr. Tiley S. McChesney, was re-elected Secretary-Treasurer. The Executive Committee consists of Messrs. Eloi J. Amar, (Long Beach), Walter G. Garland, (Camden) and Finley, W. Parker, (Galveston).

Death of former Dock Engineer Manager.

The death is announced of Mr. Edward Pearson Scorer, a former assistant engineer manager at Smith's Docks, North Shields. Mr. Scorer who was 52 years of age, was a son of the late Councillor J. S. Scorer, a dock manager in the same concern. He had retired in October 1936, in consequence of prolonged ill-health.

The Dock and Harbour Authorities' Association

Annual Meeting

THE Annual Meeting of the Dock and Harbours Authorities Association was held at the Dorchester Hotel, London, on February 23rd, and was presided over by Sir Frederick J. West, Chairman of the Manchester Ship Canal Company and President of the Association.

Commenting on the Report of the Executive Committee, which is printed below, Sir Frederick said that the extension of the Association's membership during the year by the inclusion of the four main railway companies was, in his opinion, an important step in the history of the Association. It required changes in the constitution and naturally involved considerable negotiation. He felt that those who were chiefly responsible for that important fusion, which had brought all dock authorities in the country under one inclusive body, deserved their commendation. It would, he believed, be of the greatest advantage that dock authorities were in a position to speak with a united voice on problems affecting national issues, and that the central Government in turn would be able in future to deal with an organisation representing all the dock authorities in the country. After referring to the negotiations regarding war damage between the Association and the Government, Sir Frederick paid tributes to the work of the Executive and Parliamentary Committees, of the secretary and staff, and of the Parliamentary secretary, Mr. Walter Sedgwick.

Colonel J. G. B. Beazley (Mersey Docks and Harbour Board), submitted the Executive Committee's report for 1943, and spoke of the welcome given to the four railway companies saying that the Executive Committee had been strengthened by the admission of Sir James Milne and Sir Charles Newton, and that the Parliamentary and General Matters Sub-Committee has profited by the addition of four very experienced railway officials.

Apart from the railway docks, the following authorities joined during the year: The Humber Conservancy Board, the Gloucester Harbour Trust, the Yarmouth (Isle of Wight) Pier and Harbour Commission, and the Port of Par, Ltd. The membership had thus reached the imposing figure of 66, apart from the railway ports, and it was safe to say that the Association was truly representative of the docks and ports in the United Kingdom.

Amendment of Constitution and Rules

As members knew, a special general meeting was held at the end of September to revise the Association's constitution and rules, so as to admit the railways to membership. The opportunity was taken to overhaul the rules generally, and they now cover all matters which experience showed needed attention.

War Damage

On the subject of war damage, Colonel Beazley said:

"I dealt fully with this question at last year's meeting, and referred to the Government White Paper issued in November, 1942, which outlined the proposals for the legislation needed to provide for payments in respect of war damage to and contributions from public utility undertakings in respect of all their properties (immovable and movable). I pointed out then that we

considered these proposals were not satisfactory, and particularly the principle laid down that 50 per cent. of all war damage should be borne by the Government (i.e., the taxpayers generally), and that the remaining 50 per cent. should be pooled between all owners and lessees of property, as the burden when the principle is applied to separate groups by authorities owning a special class of property which has been a target for air attack, is in property and capital of their properties much higher than that falling upon other owners.

"We have again brought our point of view before the Government and in June last a meeting with Mr. R. Ascheton (Financial Secretary to the Treasury), Sir Douglas Ritchie (chairman of the Parliamentary and General Matters Sub-Committee) who was the Association's spokesman, made a very strong case for reducing the 50 per cent. burden in the case of Dock and Harbour Authorities. Mr. Ascheton gave an assurance on this point which the Executive Committee considered involved a substantial concession and as a result it was thought necessary to ask for an interview with the Chancellor of the Exchequer. A note of the meeting with Mr. Ascheton and a letter of June 11th following the meeting were circulated to members. The Government Bill to deal with war damage to public utility undertakings has still to be introduced and it will, of course, receive very careful consideration by us when it comes forward.

Port Re-organisation

Regarding the post-war organisation of docks and harbours, Colonel Beazley said: "A good deal of time has again been devoted to this subject, and we were officially asked by the Ministry of War Transport in November last to forward any proposals for the Minister's consideration which might have been formulated. An *ad hoc*

committee has been set up, consisting of general managers of eight ports and the railway general managers, of which I am chairman, and two meetings have already been held. Any scheme or proposals arrived at by this committee will come before the Executive Committee for approval, and will then be submitted to the members. It is too early to say anything more upon the subject, except to indicate my view, which is also, I think, that of the Executive Committee, namely, that it must be in our best interests to arrive at a well-thought-out scheme of post-war organisation within our industry, rather than to have something put forward by outside interests which has not had the practical consideration which is so necessary."

"Again, like last year, a great number of questions have arisen on the constitution and scope of the 1920 Arrangement with the Government for payment of dues and a list of these is set out in the report. Many of the matters referred to under this heading have been considered by the Government Traffic (Dock Charges) Committee upon which the Association are represented, and the decisions arrived at have been communicated to members.

"One important matter has to do with the application of Clause 4 of the Arrangement, which states that if during a time of national emergency the Admiralty or the War Office, by the construction



Sir FREDERICK J. WEST, C.B.E., J.P.
(President of the Association).

Dock and Harbour Authorities' Association—continued

of works or by other services at a port, perform services which are of value to the authority at that port, they may set off the value of such works or services against any payment due to the authority under the Arrangement. There are some cases concerning members where this clause is being sought in aid by the Admiralty and the War Office, and it is expected that these will come under consideration shortly.

Pilotage Questions

"We were asked by the Ministry of War Transport in common with the United Kingdom Pilots' Association, the Chamber of Shipping, the Transport and General Workers' Union, and Trinity House, for our views upon the lines which legislation to amend the Pilotage Act, 1913, should take, particularly in relation to the present system of compulsory pilotage, and whether pilots should retain their present status or become regular employees of some central body of the local bodies.

"The Executive Committee approved the recommendations of the Parliamentary and General Matters Sub-Committee and Buoyage and Lighting of Coasts Sub-Committee, who had considered the matter jointly at two meetings, and had reached the general conclusion that the system of compulsory pilotage should be retained where it exists at present, subject to reconsideration of the area of the compulsory district in some places, and, further, that pilots should retain their licensed status and not become employees of either a central body or local bodies, but it was felt that it would be an advantage if pilots could be subject to greater control than at present."

Colonel Beazley concluded by saying that the Association was in touch with the Ministry of War Transport on such matters as arose out of Town and Country Planning that might affect the Association.

Election of Officers.

Sir Frederick West was re-elected president of the Association, on the proposal of Sir James Milne (G.W.R.), seconded by Mr. William Cuthbert (Clyde). Six retiring vice-presidents were re-elected on the proposal of Mr. B. O. Davies (Tees), seconded by Mr. Raymond (Bristol).

The appointment of the following to the Executive Committee was reported: Messrs. J. K. McKendrick (North-East Coast of England), B. O. Davies (East Coast of England), L. H. Bolton (London District), Harry Parsons (South Coast of England), R. H. Jones (Bristol Channel), Sir Thomas A. L. Brocklebank (Liverpool and North-West District), Messrs. Leslie Roberts (Manchester), William Cuthbert (West Coast of Scotland), Sir John H. Irvin (East Coast of Scotland), Mr. M. J. Watkins (Northern Ireland), Sir James Milne (G.W.R.), and Sir Charles H. Newton (L.N.E.R.).

Report of the Executive Committee for the Year 1943

The Committee present the Twenty-fourth Report of the Proceedings of the Association.

Meetings.

The last Annual Meeting was held at the Dorchester Hotel, London, W. 1, on 10th February, 1943.

A Special General Meeting was held at the Caxton Hall, Westminster, S.W. 1, on 29th September, 1943, for the purpose of approving a revised Constitution and Rules for the Association.

The Executive Committee have met nine times and Sub-Committees 13 times during the year.

There have, as usual, been a number of Meetings with Government Departments.

Twenty Circulars on various matters have been issued to Members.

The Committee are again submitting their Annual Report in the abbreviated form adopted in 1941.

Members can have full information with regard to matters merely listed on writing to the Secretary.

Honours.

The Executive Committee have noted with pleasure the award of the C.B.E. in the 1943 New Year's Honours to their colleague on the Committee, Mr. M. J. Watkins (General Manager, Belfast Harbour Commission). They are gratified that the honour of Knighthood has just been conferred upon Mr. R. T. Garrett (Port of London Authority), who was a member of the Executive Committee from 1939 to 1942, and that Captain J. W. Eaglesome (Harbour Master and Traffic Superintendent, Clyde Navigation Trust), who is a member of the Buoyage and Lighting of Coasts Sub-Committee, has received the O.B.E.

Members.

The four amalgamated Railway Companies joined the Association in respect of their Docks and Harbours after the Special General Meeting held on the 29th September had approved the necessary amendments to the Constitution and Rules.

The following other Authorities joined during the year: The Humber Conservancy Board, the Yarmouth (Isle of Wight) Pier and Harbour Commission, the Gloucester Harbour Trust, and the Port of Par, Ltd.

There are now 70 Members of the Association.

Executive Committee.

The Committee appointed Colonel J. G. B. Beazley (Mersey Docks and Harbour Board) for the third successive year as their Chairman.

Sir James Milne (General Manager, Great Western Railway Company) and Sir Charles H. Newton (General Manager, L.N.E.R. Company), joined the Committee as nominated members in October.

Sub-Committees.

A list of Sub-Committees for 1943-44 was set out in last year's Report. The following were added to the Parliamentary and General Matters Sub-Committee in October after the Railway Companies had joined the Association:—

Mr. Paul Gibb, L.N.E.R., Mr. F. A. Pope, L.M. & S.R.; Mr. H. A. Short, Southern Railway; and Mr. W. J. Thomas, G.W.R. (the last-named until 31st December).

Association's Offices.

Owing to the increase in the number of Members and the consequent enlargement in the size of Committees, it became necessary to move to larger Offices, and suitable premises have been taken on the third floor of No. 7, Victoria Street, from the Association's old Landlords.

The move was made just before Christmas.

List of Principal Matters Dealt With.

Agriculture (Miscellaneous Provisions) Act 1943.
Allocation of Coal Supplies—Rationing (Cir. No. 567).
A.R.P. Uniforms (Cir. No. 561).
Arrangement with the Government 1920 for payment of dues on ships and goods.

Application of Arrangement to:—

- (a) Salvage Vessels.
- (b) Lubricating oil (Cir. No. 577).
- (c) U.S.A. and other Allied Governments (Cir. No. 577).
- (d) Ships' equipment and Ships' stores (Cir. No. 577).
- (e) Vessels of the three General Lighthouse Authorities (Cir. No. 577).
- (f) Soldiers' personal baggage.
- (g) Post Office Stores.
- (h) Navy, Army and Air Force Institute Stores.
- (i) Small Parcels of Commercial Goods—War Office.
- (j) Landborne Coal.
- (k) Meat for Service Departments.
- (l) Ships carrying Mixed Cargoes—Colliers (Cir. No. 577).
- (m) Ships carrying Mixed Cargoes and calling at different Ports to discharge (Cir. Nos. 577 and 579).

Dock and Harbour Authorities' Association—continued

- (n) "Goods not for sale or re-sale or for any trading purpose."—Cases arising under.
- (o) Set-off dues in consideration of construction of works by the Government—Clause 4 of Arrangement.
- (p) Allowance of rebate at time of payment of dues (Cir. No. 577).

Boiler Feed Water—Chemical Analysis (Cir. No. 569).
 British Standards Institution—Specifications.
 Catering Wages Commission—Canteens.
 Central Advisory Water Committee—Third Report—River Boards (Cmd. 6465).
 Coastal Vessels—Net Register Tonnage.
 Consumer Rationing Order 1941—Various enquiries.
 Diverted Vessels—Dues on.
 Docks and Harbours—Increase of Charges.
 Dock Passes.
 Emergency Works constructed for Government Departments.
 Essential Work (Dock Labour) Order, 1941.
 Estimates of Dock Work after the War.
 Explosives and Petroleum Spirit—Discharge of—Indemnity.
 Government Traffic (Dock Charges) Committee.
 Hydro-Electric Development (Scotland) Act, 1943.
 Infestation:—

- (a) Rodent Control—Survey of Dock Areas.
- (b) Instructional course on Insect identification and control.

Kerosene Economy in the use of—for cleaning.
 Landlord & Tenant (Requisition of Land) (H.L.) Bill.
 Maintenance Staff employed by Dock and Harbour Authorities—Maintenance Award.
 Measurement of Passenger spaces excluded from net tonnage in Troop-carrying Vessels.
 National Fire Service—Emergency Water Supply Pipes.
 Navigation Marks—Notice of alteration.
 Paint—Supplies to Ports.
 Pilotage:—

- (a) Post-war Organisation.
- (b) Rates on Naval Vessels navigating in groups.
- (c) Pilot Boats—Insurance.

Post-war Organisation—Docks and Harbours.
 Private Bills.

- (a) Greenock Provisional Order Confirmation Act 1943.
- (b) Kingston-upon-Hull Corporation (Air Transport) Bill.

Public Utility Undertakings (Control of Wreck, etc.) Order 1943 (Cir. No. 565).
 Select Committee on National Expenditure, 15th Report—Salvage of Ships and Cargoes.
 Special Enactments (Extension of Time) Act, 1940 (Cir. No. 578).
 Stealing at Ports.
 Town and Country Planning (Interim Development) Act, 1943.
 War Damage—Public Utility Undertakings.
 War Gifts from Overseas—Concession in Charges.
 Water Undertakings (H.L.) Bill.

Accounts.

The expenditure charged to the year's accounts amounts to £3,018 11s. 2d., and £2,766 3s. 0d. was subscribed by members; the excess of expenditure over income amounts to £249 6s. 11d. The Executive Committee do not recommend any levy on the 1943 subscriptions but propose to carry forward the deficit of £230 1s. 7d. shown by the Accounts to the year 1944.

LIST OF MEMBERS FOR 1944.

- 1 Aberdeen Harbour Commission.
- 2 Aire and Calder Navigation.
- 3 Ardsrossan Harbour Company.
- 4 Bangor (Co. Down) Authority.
- 5 Belfast Harbour Commission.
- 6 Berwick Harbour Commission.
- 7 Bideford Corporation.
- 8 Blyth Harbour Commission.
- 9 Boston Corporation.

- 10 Bristol Authority, Port of
- 11 Cattewater Commission.
- 12 Clyde Navigation Trust.
- 13 Clyde Pilotage Authority.
- 14 Cowes Harbour Commission.
- 15 Dartmouth Harbour Commission.
- 16 Dover Harbour Board.
- 17 Dublin Port and Docks Board.
- 18 Dundee Harbour Trust.
- 19 Exmouth Dock Company.
- 20 Forth Conservancy Board.
- 21 Fraserburgh Harbour Commission.
- 22 Gloucester Authority, Port of
- 23 Gloucester Harbour Trust.
- 24 Grand Union Canal Company.
- 25 Granton Harbour Limited.
- 26 Great Yarmouth Port and Haven Commission.
- 27 Greenock Harbour Trust.
- 28 Hartlepool Port and Harbour Commission.
- 29 Harwich Harbour Conservancy Board.
- 30 Humber Conservancy Board.
- 31 Inverness Harbour Trust.
- 32 Ipswich Authority, Port of
- 33 King's Lynn Conservancy Board.
- 34 King's Lynn Docks and Railway Company.
- 35 Lancaster Port Commission.
- 36 Larne Harbour Ltd.
- 37 Leith Dock Commission.
- 38 Limerick Harbour Commission.
- 39 Littlehampton Harbour Board.
- 40 Llanelly Harbour Trust.
- 41 London Authority, Port of
- 42 Londonderry Port and Harbour Commission.
- 43 Manchester Ship Canal Company.
- 44 Medway Conservancy Board.
- 45 Mersey Docks and Harbour Board.
- 46 Millford Docks Company.
- 47 Newlyn Pier and Harbour Commission.
- 48 Newport Harbour Commission.
- 49 Par, Port of, Ltd.
- 50 Penzance Corporation.
- 51 Poole Harbour Commission.
- 52 Portsmouth, City of
- 53 Preston Authority, Port of
- 54 Ramsgate, Port of
- 55 Sandwich Port and Haven Commission.
- 56 Scarborough Harbour Commission.
- 57 Seaham Harbour Dock Company.
- 58 Shoreham Harbour Trust.
- 59 Southampton Harbour Board.
- 60 Tees Conservancy Commission
- 61 Tyne Improvement Commission.
- 62 Warkworth Harbour Commission.
- 63 Wear Commission, River.
- 64 Whitehaven Harbour Commission.
- 65 Workington Harbour and Dock Board.
- 66 Yarmouth (Isle of Wight) Pier and Harbour Commission.
- 67 Great Western Railway
- 68 London Midland & Scottish Railway
- 69 London & North Eastern Railway
- 70 Southern Railway

In respect of their
Docks and Harbours

HONORARY MEMBERS.

Harbours Association of New Zealand.
 Bombay Port Trust.
 Interstate Conference of Australian Harbour Authorities.

Publication

The Institute of Transport has issued a booklet entitled **Transport Discussion Groups**, which is a reprint from the Journal of the Institute for October, 1943; it consists of notes on the conduct of transport discussion groups, with suggestions for subjects and reading. It explains that the Transport Discussion Group as conceived by the Council of the Institute serves a twofold purpose: (a) to provide a stimulus to independent study and thought for young Associate Members as an immediate follow-up to their completed examination studies and (b) to indicate a form of meeting easy to adopt and likely to stimulate interest and growth of membership at places when the setting up of machinery for a Local Section or Centre does not appear to be justifiable. There are appended actual reports of two Discussion Group Meetings as "specimens of work done and not as models."

Notes on Dock Wall Design and Construction

By ROBERT DUNLOP BROWN, M.Inst.C.E.

(Concluded from page 235)

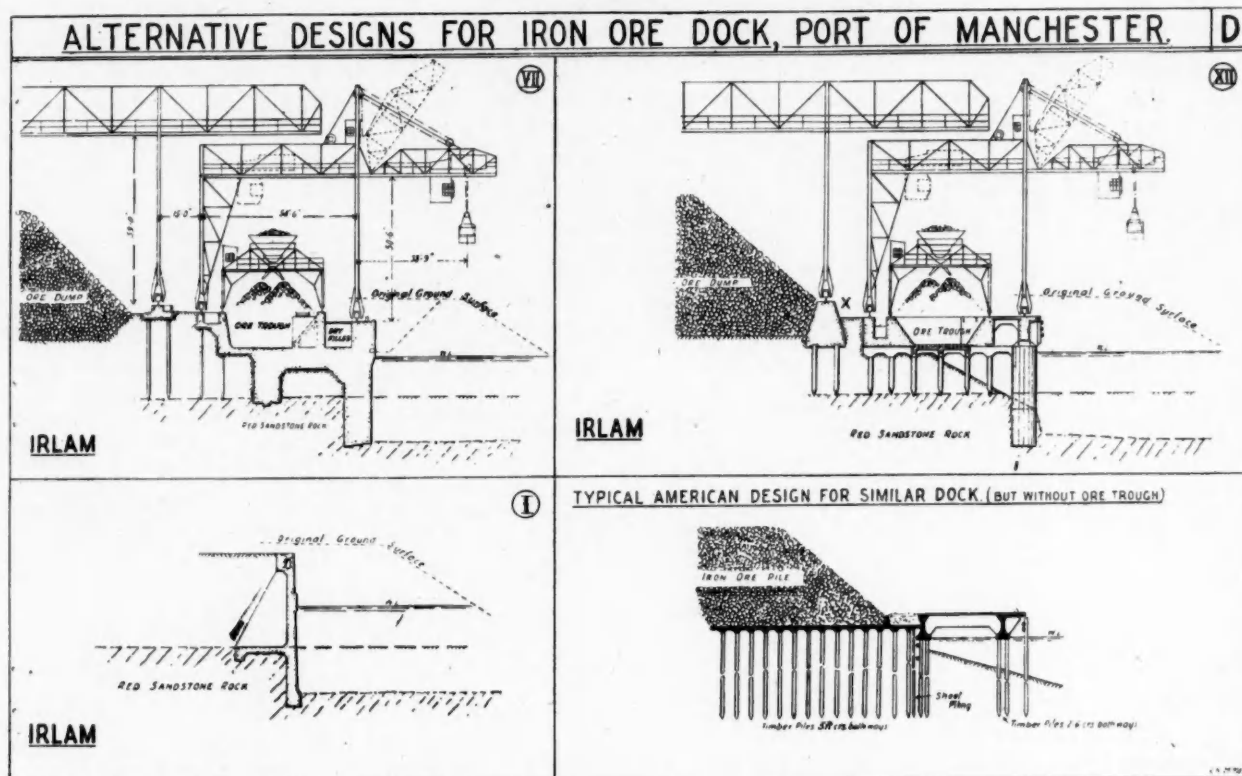


PLATE D.

IV. Alternative designs for the Iron Ore Dock recently built at Irlam, in the Port of Manchester.

In addition to the ordinary duties to be performed by a dock wall this one had to sustain a thrust from an iron ore dump, and it had to be provided with a deep transfer trough in the middle of the deck. Iron ore varies from 190-lbs. to 137-lbs. per cubic foot. The design and construction of this dock thus presented some unusual problems.

In the attempt to solve these problems twelve different designs were made. Only three are produced here. The first design (Plate D—1) was abandoned at an early stage of its development. The deep trench necessary for its foundation, would, owing to its width, require very heavy strutting. This trench would have been a costly and difficult item. The relatively thin panel opposed to the bump of a ship coming alongside was also regarded as an unfavourable feature, which would have required treatment by some kind of external fendering.

After considerable discussion from all angles, Designs VII and No. XII were put out to tender, with the following result:—

	£	s.	d.
Design No. XII	100,274	6	3
Design No. VII	78,349	13	9
Difference	21,924	12	6

*A short Paper presented under the auspices of the Panel of Lectures appointed by the Council of the Institution of Civil Engineers with the intention of bringing Student Civil Engineers at Universities and Technical Colleges into closer contact with current practice. Reproduced by permission.

Now why should there be such a difference in the two tenders?

The main reason is, that although there is less actual bulk of material in the piled and reinforced concrete design (No. XII) the price of that material per unit of volume was bound to be much higher than the corresponding unit price of mass concrete.

The actual prices per cubic yard in 1932 were:—

Design No. XII:—

Class I reinforced concrete ($1 : 1\frac{1}{2} : 3\frac{1}{2}$)
from £5 1 3 in the superstructure
to £9 13 6 in the piles.

as compared with

Design No. VII:—

Class V mass concrete ($1 : 4 : 8$)
from £1 7 0
to £1 11 8 according to position in the structure.

From the moment a fresh sheet of paper is placed on the drawing board, it must never be forgotten that the methods of construction, and the cost of the materials used, will have a most important bearing upon the successful outcome of the design.

V. Dock Walls for Messrs. Bowaters, Ellesmere Port; Port of Manchester.

For our last example to-night, let us now refer briefly to the salient points in this design. Here again, a number of trial designs were prepared but we shall confine ourselves to the one that was actually built.

The wall had to be set back from the edge of the rock cutting, where a vertical face was overlaid by a layer of soft material as shown on plate "E." The general ground level behind the wall over a considerable area was higher than usual, which meant a

Notes on Dock Wall Design and Construction—continued

very tall structure. The wharf might have been converted to an ordinary low level structure by some heavy excavation and by forming inclined road and rail approaches to the cutting. In the end, however, a compromise was reached. The front of the wharf was made low level, and the back, high level.

The governing factor in the design of the wharf was the nature and quality of the rock. Usually very substantial loads may be imposed upon rock, but on this site the rock belongs to the New Red Sandstone Series which in some situations cannot be relied upon. The upper layers of the Red Sandstone have been described by Rankine in his "Manual of Engineering," in these words, "It is the softest material to which the name of rock can be applied." It will not stand up for long on a vertical, or nearly vertical exposure. It has been found in certain localities that it might stand for many years at 1 horizontal to 5½ vertical, but

the structure of any forward drag upon it if large portions of the rock face became loose. These portions would thus be quite free to fall away from the pillars and from the tapered foundations without endangering the wall. The rock face may thus freely adjust itself to a very considerable "angle of repose"—if these words may be applied to a substance such as rock.

The excavation for the berth was carried out in the order marked I to IV on the drawing. The rock was first bared by removing about 15-ft. to 18-ft. of earth excavation. Then the narrow trench (mark II) was excavated down to rock bottom. This was carefully taken out by hand without the aid of explosives. By so doing it was hoped that the permanent inner face of the trench would be disturbed as little as possible. It was also given a fairly comfortable "angle of repose" as may be seen from the drawing. The outer portion (mark IV) was left to act

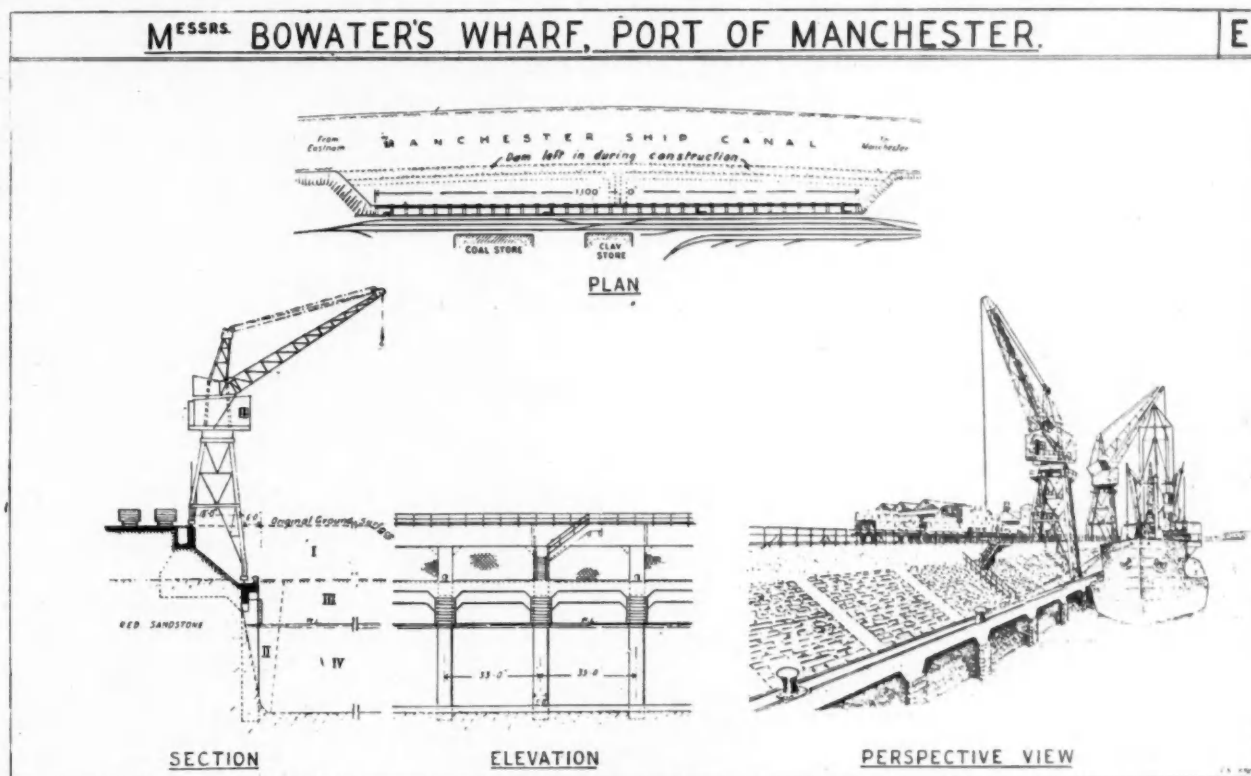


PLATE E.

that large portions will fall out from time to time. On this site the dip of the rock was 15 degrees in a Westerly direction, i.e. away from the face, and it contained cracks or fissures extending at all angles. Some of these cracks were plainly visible and others mere hair cracks scarcely discernible. In substance the rock varied from hard down to "soft and friable." Thus the main condition governing the design was, that no serious load or stress must be applied upon or near the edge of the vertical face of the rock. Accordingly, after several alternatives had been considered the design shown on plate "E" was adopted.

Pillars 6-ft. by 5-ft. were carried down below dock bottom where the rock could be relied upon to take the bearing pressure. These pillars dealt with loads from the front of the wharf. Massive triangular members were then built with their outer ends resting on the pillars, and their inner ends bedded on sound rock well back from the face. These carried the load from the back of the wharf. In plan, the base of the triangular members was made wedge shape, thickening out towards the back. So long as the rock remains sound the wedge shape acts as a dovetail and anchors the structure to the land; but the real function of the taper was something quite different. It was really intended to relieve

as a cofferdam as long as possible. It was reduced from the land side until it was no longer possible for the drilling and excavating machines to work upon it with safety. The balance of mark IV, excavation from the cofferdam, was removed by floating dredging plant.

Acknowledgments.

We are much indebted to Mr. R. Nobbs for the care and skill which he has displayed in preparing the drawings; to Mr. A. E. Eckersley for the original of the perspective sketch on plate "E"; to Dr. Brysson Cunningham, M.Inst.C.E., Editor of *The Dock and Harbour Authority*, for permission to reproduce certain sketches, marked A2 to B6 inclusive from that Journal; also to Mr. F. B. Greenwood, M.Inst.C.E., Chief Engineer of the Manchester Ship Canal Company for permission to refer to the works at the Port of Manchester. The Contractors for two of the works mentioned were Messrs. Sir Alfred McAlpine & Sons, Ltd., and we are also obliged to them for their permission freely given to publish their prices for certain items mentioned in the paper. To all these gentlemen—for their kindly interest and assistance—we are most grateful and offer our sincere thanks.

Inland Waterways in Modern Transportation

In an Address on "Transport—Past, Present and Future," to the Sheffield and District Section of the Junior Institution of Engineers delivered in September last, the Chairman of the Section, **Mr. R. W. T. Norton**, made the following observations on Inland Water Transport.

Inland Waterways.

This means of transport may be separated into three classes: river, ship canal, and inland water canals proper.

River transport does not play a very important part in this country in comparison to some of the countries mentioned later. This may be due to our short rivers and well-designed railway system, combined with good road facilities, which would make the re-shipping of goods and passengers not worth the trouble and delay for the relatively short journey.

In countries such as Russia, U.S.A., Canada, some countries in Europe, and especially China, such rivers as the Volga play a very important part in transport. The Danube, another important river which flows through Rumania, Hungary, Yugoslavia and Germany, is as famous for river transport as the Volga, likewise also the St. Lawrence in Canada. In the U.S.A. such rivers as the Hudson, the Ohio, Mississippi and the Tennessee play an important part in transportation. On the latter more than £75,000,000 has been expended in regulating the flow, and to combat the erosion of the surrounding land. The Rhine, which runs through the industrial heart of Germany, is a typical example of how important a river can be to the industry of a country.

The three main rivers of China are: the Hwang-Ho, Yangtse, and the West River. The Yangtse is the longest river in China, 3,400 miles long. When we are told that on the basin of this river one-twelfth of the whole population of the world lives, it goes to show what an important factor river transport can be.

These rivers of China are the life-line of the people—boats ranging from large steamers to three plank sampans are the transport of the population of China, and the waterside of river towns is sometimes so crowded with boats, that you would hardly know a river ran beneath. Many children are born and live all their lives on these boats, and as soon as the child can toddle he will have a float tied round his waist, so that if he falls overboard he will have a good chance of being saved.

These are only a few of the many rivers which play an important part in transport; there are many others such as the Congo, in Africa, the Euphrates in Iraq, the Indus and Ganges in India, the Nile in Egypt, and the famous Amazon River in South America.

Ship Canals.

It is most probable that this means of transport, because of its importance and the remarkable engineering feats that have been performed to make it possible, is so well known to you all, that it will only be necessary to mention one or two of the most important, and pay tribute to the people responsible for their achievement and the beneficial result in the saving of time to shipping by these canals.

A few of the well-known are:—

- (1) The Panama, on the Gulf of Panama, which connects with the Caribbean Sea and saves the distance round South America.
- (2) The Suez, connecting the Mediterranean Sea to the Red Sea and saving the journey round Africa.
- (3) Manchester Ship Canal that makes Manchester an inland port.
- (4) The Kiel Canal.
- (5) The Dutch North Sea Canal which plays a very important part for Amsterdam.
- (6) The Caledonian Canal from Moray Firth on the North Sea to Loch Finnie on the west coast of Scotland.

- (7) The Corinth Canal which links the Aegean Sea with the Gulf of Corinth.
- (8) The Canal Du Midi, the great Languedoc Canal from Certe to Garonne at Toulouse.

Many other ship canals have been constructed to help in assisting to improve the transport of the world, each of which is a paper in itself and an engineering achievement.

Inland Waterways Proper.

It is difficult in these days of mechanical means of transport which includes rail, road and air, to realise the importance of the part played in transport not so long ago, by canals (apart from ship canals already mentioned) designed to take nothing larger than barges and small craft.

During the eighteenth and early nineteenth centuries, the face of these islands, as of many other countries, became gradually covered by a network of canals and locks, largely still existing, designed to give better transport than could be obtained by the only alternative then available, the horse-drawn vehicle with its limited capacity and painfully slow on a main road system, which, at present, would be condemned as unsuitable for wheeled traffic.

It is claimed that with the waterways or canals of Great Britain two names should be remembered above all others—Bridgewater and Brindley. It has been stated that to James Brindley, Great Britain owed the complex system of canals which contributed so much to the growth of industry.

The first of all British navigation canals was built between Worsley (Lancashire) and Manchester by J. Brindley for the Duke of Bridgewater, owner of the collieries. The reason that prompted the building of this canal was to cheapen the transport cost of the coal to Manchester. Brindley's greatest work was the Grand Trunk Canal. When considering this means of transport we must not forget such men as Smeaton or Eddystone Lighthouse fame who designed many canals, John Rennie and Thomas Telford who was already famous as a bridge builder.

The canals of this country fell somewhat in disuse owing to the development of the railways. This is not so in some other countries such as France, Belgium and Sweden which have extensive canal transport, and Germany has some outstanding engineering structures in connection with their canal system on which a few remarks are worth while.

The following are two outstanding features of engineering operating on the German canals.

First, a lift capable of conveying a 1,000-ton barge a vertical distance of 116 ft. in one lift.

The Niderfinow Barge Lift, situated on the Hohenzollern Canal, permits inland navigation between Berlin and Stettin. This remarkable structure was estimated to weigh 20,000 tons. The slightest subsidence would throw the whole system out of truth and make the working impossible. The lift is nearly 200 ft. high, 308 ft. long, and 88 ft. wide, and the speed of the electrically-driven lift is approximately 20 ft. per minute. With these few remarks you will appreciate the saving of time in transport and the magnitude of the structure.

The Overland Canal between Elbing and Osterode in East Prussia is the second unusual means of transport in connection with canals and is the means used to convey the barges overland to different levels. A specially constructed wagon is run on lines into the water so that the barge can float into this crate-like wagon, and is then hauled overland to the next water level. The five land sections make a difference of 110 yards in the canal level. This means was adopted by Steenke.

No paper in connection with transport by inland waterways would be complete without some observation on the marvellous canals of Russia. The Baltic White Sea Canal, the Moskva-Volga Canal, and the Volga-Don Canal will make Moscow a great inland port with waterways available for large vessels and with an outlet to the most important water transport routes of the Soviet Union, the Baltic, the White Sea, the Caspian Sea, and on the completion of the Volga-Don Canal, to the Sea of Azov and thence to the Black Sea.

These brief remarks on inland waterways will show how important this means of transport is to various countries.

Tidal Levels of the Thames

The Origin and History of Trinity High Water†

By Wm. B. HALL, M.Inst.C.E.*

Introduction

IN the early years of the nineteenth century there was rapid development of the River Thames as the Port of London, and there was laid in those years the foundation of the great system of enclosed docks which, with the River itself in its unceasing ebb and flow have made the Port of London the centre of so much of the world's commerce.

One curious and undesigned result of the activities of those early years was the establishment of a unique datum level, known to all users of the River Thames by the name of Trinity High Water, Trinity High Water Mark or Trinity High Water Datum, and, less frequently, as Trinity Datum or Trinity Standard.

In spite of its adventitious origin its known errors and its unsuitability for engineering and surveying purposes, Trinity High Water is still in use as the principal datum of the Port of London.

Although partial explanations have been made, its origin has not until now been satisfactorily accounted for. Through the kindness of the Port of London Authority, the Corporation of the City of London, the Corporation of the Trinity House, the Royal Society and the Director General of the Ordnance Survey in allowing their records to be consulted, it has been possible for the writer, in the following pages to trace the various events which have led to its general use. It has been found that it was not established directly by the Trinity House, nor was it established in 1800 as is generally supposed. Its interesting name was derived only from the association of that ancient corporation with the events leading up to the building of the London Docks in 1800 and from the fact that the well-known "Mark" at Hermitage Dock, which was adopted arbitrarily in 1820 by John Rennie as a high water datum, was placed in position in 1800 by Captain Joseph Huddart, a well-known Elder Brother of Trinity House.

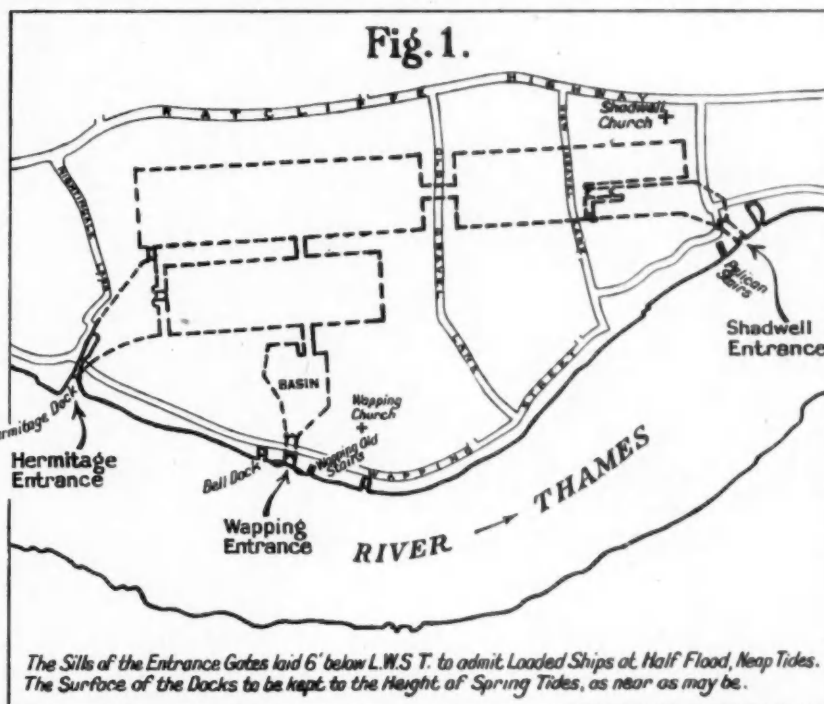
The purpose of the writer has not, however, been merely to explore a by-path in the history of the Port but to shew that the time has come for a serious examination of these levels. The recent re-levelling of England and Wales by the Ordnance Survey Department has emphasised the already large errors in all Trinity High Water Marks and these errors must of necessity be reflected in the working datum levels in use for tidal and river survey purposes. These, and other reasons adduced in the following pages, make it imperative, in the writer's opinion, that a revision of these levels should be undertaken.

The writer does not seek to make any attack upon a custom which has served the Port of London for so long, still less does he seek to criticise the outstanding men under whose hands this custom has grown up; neither would he desire that such interesting names as "Trinity Standard" and "Trinity Mark" should disappear, but he would preserve them in the same way that the City has preserved the name of "Lloyd's Coffee House" by retaining them in a modern setting where the scheme of things,

the system of datums, is designed for modern purposes and not for the purposes of the 18th century.

That is to say, the new and accurate Ordnance Datum should, undoubtedly, be made the Principal Datum of the Port and the standard of reference for all secondary datum levels.

Further, a Secondary or Low Water Datum, exactly ten feet below the new Ordnance Datum and, it may be suggested, termed London Zero Tide, would form a practical datum, modified as required, for all tidal purposes. Finally, Trinity High Water would remain as a tide level, 21½-ft. above the London Zero Tide, to be used only for dock purposes. As, however, the Trinity Marks are no longer used for any exact purpose, they



might well remain with all their inaccuracies as rough guides to the state of the tide. Also, the reference to Trinity Standard in the Authority's Act may be deleted.

Throughout these notes the writer will use the rather inelegant word "datums" instead of the Latin "data."

The Corporation of the Trinity House.

In 1514 King Henry the Eighth granted a charter to a guild now generally known as the Trinity House, but sometimes described as "the master, wardens and assistants of the guild fraternity or brotherhood of the Most Glorious and Undivided Trinity and of St. Clement in the parish of Deptford Strond in the County of Kent commonly called the Corporation of the Trinity House of Deptford Strond."

Succeeding sovereigns confirmed and enlarged this charter and for centuries the Elder Brethren of the Trinity House have played an important part in England's maritime and commercial growth. It was, therefore, natural that Parliament and the Merchants of London, at the end of the eighteenth century, should turn to the Corporation of the Trinity House for guidance in the problems of the Port, which were then being discussed. From the part

†Paper submitted to the Institution of Civil Engineers and published in abstract in the Journal of the Institution. Reproduced by permission.

*Chief Draughtsman, Port of London Authority.

Tidal Levels of the Thames—continued

taken by it in parliamentary and private committees arose, indirectly, that level, or datum, known as Trinity High Water, associated so closely with the name of Captain Joseph Huddart, Elder Brother.

Port of London Public Enquiry—1796.

In 1796, as a result of public agitation, a Select Committee of the House of Commons was appointed "to enquire into the best mode of providing sufficient accommodation for the increased trade and shipping of the Port of London." Several schemes for the improvement of the River or for the construction of canals and enclosed docks, were submitted and were referred to the Trinity House for examination, while much evidence was given on the state of the river and shipping, and on tidal matters. From the reports, issued in 1796 and 1799, may be traced the origin of the 18-ft. tide which later became known as "Trinity Tide."

The most active advocate of dock construction was a committee of London Merchants, whose plan for docks at Wapping materialised later as London Docks, and of this committee a prominent member was Mr. William Vaughan, who later became a director of the London Dock Company. The Merchants' Plan, as it is called in the 1796 report, included a series of docks ex-

Mr. John Rennie supported the Merchants' Plan and his evidence regarding the depth and surface of the water was almost in the words already quoted. It is to Mr. Rennie that the planning and construction of London Docks are principally due.

Mr. Ralph Walker submitted a tide predictor based on the assumption that 18-ft. was the spring-tide range from London Bridge to Blackwall.

Captain Shields, Surveyor of Shipping in Lloyds' Coffee House, who was associated with Mr. Vaughan in river investigations, submitted a table of "Common Spring Tides" which, he stated, were in agreement with Captain Huddart's observations and in which the "Rise of Tide" was given as follows:—

Place	Feet	Inches
Botolph Wharf (near London Bridge) ...	18	10
Tower Wharf ...	18	1
East Lane ...	18	1½
Shadwell Dock ...	18	5½
Limehouse Hole ...	18	10
Greenland Dock ...	19	2
Deptford Creek ...	19	6½
Crawley's Wharf ...	19	10
A sluice opposite River Lea ...	20	2½

Mr. George Dance, Clerk of Works to the City Corporation, said the range of "Common Spring Tides" at London Bridge was 19-ft. 9-in.

Mr. Daniel Alexander, Surveyor to the City Corporation, gave the "Rise of Spring Tides" as 18 to 20-ft. and neap tides as 12 to 14-ft.

Captain Thomas King, Elder Brother, stated that a "medium" tide was 13 to 18-ft. and a spring tide 2 or 3-ft. higher.

Mr. Samuel Brown, Surveyor to the Customs, stated that "the tide.....at spring tides flows 17 to 18-ft. and in some winds to 20-ft."

Captain Huddart submitted a chart of the Pool, dated 1758, and another made by himself in 1794. His evidence may be given in full.

"In order to ascertain the true situation of the tides I had three staves erected, one at Blackwall, another at Limehouse and a third at the present legal quays, with people to attend each during one of the revolutions of the moon, or from the 10th of May to the 8th of June—soundings in red are reduced to the lowest ebb that happened between the interval.

"We found that the rise of tides at Blackwall exceeded those at the legal quays in the river from 8 to 16 inches and those at Limehouse from 6 to 8 inches.

"I was in the boat at the taking of them and the hour and minute of dropping the lead was taken and reduced by the staves, where time was kept also, to the lowest tide between the 12th of May and the 8th of June (1794).

"The full rise of Spring Tide is 20-ft. at Blackwall, that is, where in the chart is 9-ft. at low-water, 19 at half-tide, and 29 at full-tide—Neap-tide the rise is 6-ft. 7-in. above the half-tide and makes 25-ft. 7-in. where there is 9-ft. upon the chart."

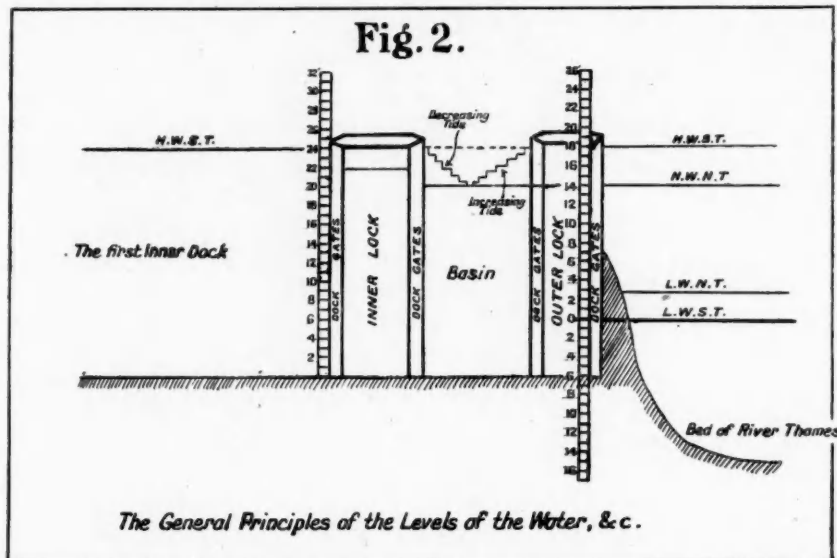
Tabulating these results and interpolating a value for Wapping which is about midway between the Legal Quays and Limehouse, the following average values of the "full rise of spring tides" may be given. It may be assumed that here the word "rise" is equivalent to what is now called "range."

Place	Feet	Inches
At the Legal Quays ...	19	0
Wapping ...	19	2½
Limehouse ...	19	5
Blackwall ...	20	0

Captain Joseph Huddart

It would not be proper in any history of Trinity High Water to omit reference to Captain Joseph Huddart.

Born in 1740 in Cumberland, of a seafaring family, he went early to sea and ultimately had command of a ship of the Honourable East India Company.



tending from Nightingale Lane to Shadwell, with, at first, an entrance at Wapping.

In a pamphlet dated 1794, Mr. Vaughan wrote:—"The depth of water for the docks should be about 18 to 20-ft. The Spring-tides rise about 18 to 20-ft. The Neap-tides 12 to 14-ft. but subject to fluctuation from the variations of winds and the effect which the sea has upon the fresh water tide of the River." In a later pamphlet Mr. Vaughan wrote:—"The tide flows gently from the Nore to Teddington to an average of 18-ft. at the London Docks on Spring-tides in a calm and gentle rise..... there are occasional fluctuations which cause the tides to flow about 20-ft. and upwards."

In submitting the Merchants' Plan to the Committee in 1796, Mr. Vaughan handed in a plan of the proposed docks (fig. 1) and a longitudinal section of the entrance lock (fig. 2). In the latter there are some interesting data about the daily variation in tides which need not be repeated here and it is sufficient to observe that the tides given were as follows:—

Spring-tide range — 18 feet.

Neap-tide range — 11 feet.

In the plan there is the following note:—

"The sills of the entrance lock (would be) laid 6-ft. below the low water of spring tides, the surface of the docks to be kept to the height of spring tides as near as may be, supplied by the surface only of each tide.....so as to prevent silting in the docks."

Tidal Levels of the Thames—continued

His ability as navigator and scientist brought him election in 1791 as an Elder Brother of the Trinity House and a Fellow of the Royal Society, and in 1800 he was "solicited" to become a Director of the London Dock Company.

He died in 1816. His biographer describes him as a man of high character whose work during 25 years at the Trinity House "will be long remembered." The fulfilment of this may be seen in the Port of London (Consolidation) Act, 1920, where his name is still "remembered" in Section 309.

One of the most active advocates of the London Docks was Mr. William Vaughan, a London merchant, who undertook many investigations into commercial and river matters preceding their construction and who became one of the first Directors. He left several volumes of memoranda relating to many matters in which he was interested, and these are now in the Library of the Port of London Authority. A few deal with the tides and probably form the basis of his evidence before the Inquiry. As, however, the levels are not recoverable the figures need not be given here. But the following letter may be given fully as the only autograph letter of Captain Huddart which the writer has been able to secure.

Highbury Avenue,
24th September, 1794.

Sir,—“I have extracted the following remarks from the observations on the tides made at Fresh Wharf, which is a few yards below London Bridge.

“The fall of the ebb tide thro Bridge occasions the tide of flood to rise on a mean about 4-ft. 6-in. before the stream of tide run upwards; and at high water it falls about 1-ft. 6-ins. before the tide sets downwards.

“The time of high water at London Bridge is I believe in general meant for the change of the stream thro bridge which is about 55' after high water.

“At full and change the tide flows about 2^H—10' after the moon's southing and nothing to which if we add 55' give 3^H—5' high water slack.

“At the moon's Quarters it flows 0^H—55' after the moon passes the meridian's + 55' gives 1^H—50' for the high water slack.

“The greatest difference between the highest Spring and the lowest Neap tide at high water from May 15th to June 6th was 4-ft. 9-ins. but for a Mean not more than 4-ft. should be allowed for the difference and the greatest rise from Low water to High Water during this time was 18-ft. 6-ins.

I am,
Yours sincerely,
(Signed) J. HUDDART.

Mr. Walker.

“The flood rises 4^H—28' when the Springs are at the height and about 5^H—30' at dead Neaps.”

The London Dock Act—1800.

In July 1799 an Act of Parliament was passed entitled “An Act for rendering more commodious and for better regulating the Port of London.” By this Act the building of the West India Docks was authorised, without restriction as regards water levels, depth of sills or levels of any kind.

In June 1800 the London Dock Act was passed entitled “An Act for making Wet Docks, Basins, Cuts and other Works for the greater accommodation and security of shipping, Commerce and Revenue, within the Port of London.”

Three Entrances were mentioned, “at or near”—

- (1) Hermitage Dock.
- (2) The River Side between Bell Dock and Wapping Old Stairs.
- (3) Shadwell Dock.

The 54th Section of the Act required the Company to complete, within 7 years, one or more Docks, Basins, Lighter Docks, Entrances, Communications or Inlets and to make them..... “in all parts equal in depth (except the entrance at the Hermitage).....” “the depth shall not be less in any part than within 15-ins. of the level of the River at Low Water Mark.”

The 55th Section says:—

“.....and in order to prevent disputes about the line or height of the said Low Water Mark be it further enacted that the same shall be settled and determined by two of the Elder Brothers of the Trinity House, within three calendar months next after passing of this Act, who shall certify the same in writing under their hands and seals.”

The 98th Section gives the Company power to take sand from the bed of the river between high and low water marks, but these are not defined.

It is clear that the Act did not require either the Dock Company or the Trinity House to fix a High Water and the many later attempts to give this meaning to the Act were entirely unjustified.

The Act did not define low water as springs or neaps and it was probably the intention of Parliament that considerable latitude should be given to the Trinity House in fixing a low water suited to the requirements of navigation. That the low water ultimately decided upon was considerably higher than the spring tides was suggested by evidence given in reference to St. Katherine Docks in 1825.

The London Dock Company, 1800.

Upon the formation of the London Dock Company the Directors took immediate steps to have the low water settled. On the 29th July, 1800, it was resolved to transmit a copy of the Act to the Trinity House with a request to “fix the line of the low water of the River Thames agreeably to the clause in the Act, page 40, and a few days later six copies of the plan of the docks, indicating the proposed three entrances where low water should be ascertained, were also sent.

Early in August, the Trinity House referred the matter to a “Committee consisting of Captains Calvert, Brown, Easterly, Joseph Cotton, Huddart, and other such Brethren whom it may suit to attend, to ascertain the low water mark at the places above mentioned as requested by the Directors and report to the Board in order that a certificate thereof may be signed, agreeable to the Act of Parliament.”

At the beginning of September a report was made to the General Court; Mr. Weston, the Solicitor, was instructed to draw up a certificate in parchment and Captains Brown and Chapman were requested to sign it. It was then sent, “with an account of the expenses,” to the Directors.

Trinity Low Water.

The certificate, after the preamble, proceeds as follows:—

“Now know you that we the said Thomas Brown and Abel Chapman.....who have been requested and appointed..... to settle and determine the line or height of the said low water mark within those limits do by this instrument under our hands and seals certify and declare that we have settled and determined the line or height of low water mark to be seventeen feet ten inches below the level of a line cut and made by our direction in a certain post fixed at or near the Hermitage Dock and seventeen feet eleven inches below the level of a certain other line cut and made by our direction in a certain other post fixed between Bell Dock and Wapping Old Stairs and eighteen feet three inches below the level of a certain other line cut and made by our direction in a certain other post fixed at or near Shadwell Dock and inasmuch as the said marks are now made on wooden posts we recommend that stone piers properly made according to the same levels be substituted in lieu thereof to prevent the defacing thereof at any time hereafter. In testimony whereof we have hereunto set our hands and seals this Fifth Day of September in the Year of our Lord, One Thousand Eight Hundred.

Signed, sealed and delivered	
in the presence of	
James Weston, Fenchurch Street,	} Thomas Brown.
Thos. Bryan, Clerk to Messrs.	
J. and A. Weston.	
	Abel Chapman.

On the 9th September the certificate was received by the Directors and a resolution of thanks transmitted to the Trinity House.

Tidal Levels of the Thames—continued

Unfortunately the certificate has been lost but the wording has been preserved by the Trinity House.

The time during which all the above transactions took place was from 29th July to 9th September and the phases of the moon in 1800 were approximately as follows:—

Full Moon — 5th August.
New Moon — 21st August.
Full Moon — 4th September.

It is probable that the investigations were largely undertaken by Captain Huddart. It is further probable that in view of the purpose of the investigations and consistently with his observations of 1794, he erected graduated staves at the three points and, averaging a few of the tides at about full and new moon, arrived at a mean value sufficiently accurate for his purpose. In the following pages it will be seen that the tide so arrived at was more akin to an ordinary tide than to a spring tide.

Three Trinity Marks.

At a Court of Directors of the Dock Company held on 26th August, 1800, the Committee of "Plans, Contracts, and Works" (of which Captain Huddart was a member) reported that a Mason should be employed to make stone gauges for describing low water mark and apparently no time was lost in carrying out the suggestion of the Trinity House to make permanent stone marks. There is, however, nothing further in the records of the Company referring to these stones.

Trinity Mark at Hermitage Dock.

Hermitage Dock was an inlet of considerable importance and much used by smaller craft. It extended about 120 yards from the River and about 1820, was incorporated in the present Hermitage Entrance to London Docks. Hoare's Wharf was on the east and Downe's Wharf on the west side. When Hermitage Entrance was completed in 1820, the stone was probably removed from its original position and replaced in its present position in a new line of the lower wing wall several yards in front of the older wing wall. The alteration in the line of the wall is shown on a drawing belonging to the Port of London Authority.

But the first specific reference to the stone is contained in a report of 1823 submitted to the Bridge House Estates Committee of the City Corporation.

"The following inscription is engraved on a stone let into the lower external wing-wall of the Hermitage Entrance to the London Docks:—

"Low Water Mark is seventeen feet and ten inches below the lower edge of this stone settled by the Corporation of the Trinity House, August, 1800."

In 1842 Mr. James Elmes, Surveyor to the City Corporation published a Guide Book in which he describes the stone.

In 1852, it was used as a starting point by Mr. MacDougall Smith in a survey from Battersea to Charlton.

After this date frequent reference was made to the stone by various authorities and these will be discussed.

The stone may now be recognised by faint traces of the lettering and cut recesses at the corners.

The present level of the lower edge is 10.83-ft. above the new datum of the Ordnance Survey, termed Newlyn Datum. It is not possible to recover with any accuracy the level in 1800 as the stone may not have been replaced at its proper level when the line of the wall was altered and the wall itself may have settled downwards.

In 1853 the level of T.H.W. was given as 12.53-ft. above the Ordnance (Liverpool) Datum. The difference between Liverpool and Newlyn Datum is 1.4-ft. at this place and in 1853 the level may be taken as about 11-ft. above Newlyn Datum. But between 1800 and 1853 considerable settlement must have occurred in the wing-wall and having regard to the alterations of 1820 it is difficult if not impossible to give a closer estimate of the original level than 11½-ft. above Newlyn Datum.

Trinity Mark at Bell Dock.

Bell Dock was a graving dock westward of the proposed Wapping Entrance; it was filled in about 1811 and is now known as St. Helen's Wharf. Wapping Old Stairs are eastward of the Entrance.

No record of this stone has been found, but it may be presumed that one was placed here and used for determining the level of the sill of Wapping Entrance.

Trinity Mark at Shadwell Dock.

The certificate of the Elder Brethren states that a mark was made "at or near Shadwell Dock," a graving dock about 200-ft. below Pelican Stairs and on the site of the "Old Shadwell Entrance," now filled in.

The earliest reference to it is contained in the Guide Book of Mr. James Elmes (1842).

"There is another (stone) built into the wall of the house adjoining eastward to the "Town of Whitby" Public House at Wapping, belonging to Messrs. Oliver & Co., Anchor-smiths, with a similar inscription denoting the low water mark to be 18-ft. and 3-ins. below their high water mark." Mr. Elmes merely assumed the stone to mark high water.

About 1849 the Metropolitan Sewers Committee published a tide table in which the stone at Shadwell was said to be 12.628-ft. above Ordnance Datum.



Fig. 3.

In 1877 Mr. Redman referred to it in a paper on the River Thames, read before the Institution of Civil Engineers.

It may still be seen, built into the river wall at the base of a small private dwelling house adjoining the east boundary of the "Prospect of Whitby" Public House (fig. 3).

The stone measures 33 inches across and 17½ inches deep and has a dovetail recess at each corner. It stands out about ¾-in. from the face of the wall.

The inscription with the exception of a few letters is clearly legible. It is in block letters cut into the stone as follows:—

LOW WATER MARK
IS EIGHTEEN FEET AND
THREE INCHES BELOW THE
LOWER EDGE OF THIS STONE
SETTLED BY THE CORPORATION
OF THE TRINITY HOUSE
AUGUST MDCCC.

The Shadwell stone was not used for any dock construction, as the extensions eastward to Shadwell between 1830 and 1850 were probably carried out to the same levels as the original portion of London Docks.

The height of the Shadwell stone above Newlyn Datum is now 11.13-ft., that is about 4-ins. higher than the present level of Hermitage stone.

Tidal Levels of the Thames—continued

Comparative Levels.

Hermitage Mark	...	17-ft. 10-in. to Low Water
Wapping Entrance Mark	...	17-ft. 11-in. " " "
Shadwell Mark	...	18-ft. 3-in. " " "

Hermitage and Shadwell are only one mile apart and low water level at Shadwell may only be a fraction of an inch lower than low water at Hermitage. Assuming that in 1800 the low water was practically level at these two places the Mark at Shadwell was therefore 5-ins. higher than the Mark at Hermitage.

There is no reason to suppose that high water at Shadwell was higher than at Hermitage. The records of observations taken in 1820 by Mr. James Mountague state "The tides from London Docks to Billingsgate.....average generally one level at High Water." Diagrams published by the Port of London Authority show high water at Shadwell slightly lower than at Hermitage.

These considerations suggest that Captain Huddart's Marks were arbitrarily chosen. Nevertheless, it is not impossible that they may represent a high water corresponding to the low water they were primary intended to indicate, and it may be found after research that high water at Shadwell was, at that time, above high water at Hermitage by a few inches.

The London Docks—1801. Fixing a Standard High Water.

At a Court of Directors held on 17th March, 1801, a report on the general plan of the docks was submitted by John Rennie, Robert Mylne and Captain Huddart and adopted. It dealt with the proposed first stage of the works, comprising the Main Dock (now the Western Dock), Wapping Basin, and the Entrance at Wapping.

It stated:—

- (1) The Dock is proposed to be 19-ft. 3-ins. deep in water at an 18-ft. Spring Tide (as a standard measure).
- (2) We have determined that the draft of water throughout the whole (of the basin) should be 5-ft. below the lowest water of an 18-ft. spring tide with the waterway in front of the Entrance deepening from thence..... to the River.

Apparently some consideration was given to the advantages that might have resulted from raising the surface of the water in the Main Dock two feet above that in the Basin, for Mr. Daniel Alexander, Surveyor, submitted a report on this matter, which, however, was not adopted. The report dealt with several questions and only the following need be quoted:—

"Raising the Dock Surface."

"But an object of great importance is this last, that of raising the Dock Surface, its bottom, quays and warehouses."

"The surface of the water in the Docks, as the plan now stands, is level with 18-ft. Tide, ordinary springs and the depth is 19-ft. 3-ins. below this level. The *original intention* (1796), was to have had the level of a 20-ft. Tide and 22-ft. in depth, the Spring Tides are sometimes 20-ft. and have run as high as 21-ft.

"Now I would suppose the surface of the water in the Dock raised up to the level of 2-ft. above 18-ft. Tide and its depth of water continued 19-ft. 3-ins. as at present proposed.....consequently 2-ft. less to dig and 2-ft. to lock up above the level of an 18-ft. tide in the Basin."

The report refers to the 18-ft. tide as "an ordinary spring tide" or "a common spring tide" and states that "high tides during strong winds at equinoxes will flow the Dock above the 18-ft. tide."

In 1803 (January) Mr. Rennie reported to the Court on the general progress of the works as follows:—

"The quay wall of the Dock opposite the Tobacco Warehouses is completed to the top of the stone courses, being somewhat above level of surface water or 18-ft. tide mark."

The foregoing makes it clear that the 18-ft. tide, so often called a Trinity Tide, was established "as a standard measure" more or less arbitrarily, by the engineers of the Dock Company solely in order to determine the surface level of the Docks.

Wapping Entrance was opened to shipping in February 1805. At each side figures showing the depth of water above the entrance sills, were cut deeply in the masonry* and for many years records which will be referred to later were kept of the tidal heights at this point. No mention of Trinity High Water was made in these records, but the 5-ft. mark was mentioned in 1805 as being the "Trinity mark" of low water.

In 1832 Captain Lloyd, whose survey is described in a later chapter stated:—"The index mark XXIII (at Wapping) answers to the 18-ft. Trinity High Water of 1800."

In 1809 the Engineers of the Dock Company made a survey of the levels of roads adjoining the Docks and used the "18-ft. tide" as a datum. Apparently by this time the 23-ft. mark on Wapping Entrance was established as a recognised engineering datum.

A Fourth Trinity Mark.

Mr. James Elmes in his Guide Book of 1842 makes a reference to another mark which, if it is correctly described, was probably a fourth stone laid down to indicate the high water adopted in the construction of Wapping Entrance.

"The heights of the tide, before the completion of the docks, that is, from 1801 to 1805, were taken by the averaged 18-ft. tide at the Trinity Mark, or, as it is called, "Trinity Datum." These marks are fixed in the lower wing wall of the lock gates of the upper entrance, guarded by iron grating and inscribed—

TRINITY DATUM
1801

This standard or datum is, and has been, used in all calculations of the heights of the tides, and has been levelled and carried up and down the river, and marked on several permanent places by.....the Corporation of London....."

The existence of this stone may be doubted and there is now no trace of it. It is probable that Mr. Elmes was referring to the Hermitage stone already described and was misled as to the inscription. He was frequently inaccurate.

(To be continued)

Southampton Harbour Board

Displacement of Local Representatives

Mr. Harry Parsons, chairman of the Southampton Harbour Board for the past 21 years, has failed to secure re-election as a representative on the Board of the Southampton Chamber of Commerce. The new Chamber of Commerce representatives are Messrs. F. R. Alderwick and W. S. Dixon. They will serve for 3 years from March 1st

Mr. Parsons first joined the Board in March, 1920, and was elected chairman in succession to the late Mr. F. Beresford Turner in April, 1923. The outstanding feature of his long term of office was his work in connection with the establishment at Southampton of an Empire air base. He was chairman of the special sub-committee which carried the project through, and the Board, at its meeting in August, 1939, passed a resolution thanking him for his "indefatigable efforts—spread over a period of years—and his leadership which resulted in the establishment of a marine air base at Southampton." During his chairmanship the Board carried out vast schemes of dredging, the new docks were opened, and the Board's offices were re-built.

The following have been elected as representatives of the Borough Council for the ensuing year on the Southampton Harbour Board: Messrs. P. W. Blanchard, G. A. Waller, Alderman P. V. Bowyer, F. S. Smith, H. Vincent, and S. J. Lane, together with the Mayor (Councillor R. J. Stranger). Aldermen Sir Sidney Kimber and F. Bath have been displaced. The former was deputy chairman and the latter, chairman of the Finance Committee of the Board.

*See Fig. 5 in next instalment.

National Association of Port Employers

Its History and Activities

By. D. F. MACDONALD, M.A., D.Phil.

The recent adoption by the National Council of Port Labour Employers of a revised Constitution and a new title (National Association of Port Employers) makes timely a sketch of this organisation's history and activities.

Its Inception.

The National Council of Port Labour Employers came into being in 1920. The need for a concerted policy among Employers of port labour had become very apparent in the previous years, with the presentation by the National Transport Workers' Federation and its affiliated Unions of a claim for a 44-hour week, followed by a claim for a national minimum wage. Arising out of the second of those claims, a provisional National Council was set up, under the leadership of Sir Alfred Booth, Bart., through which the Employer interests were represented at the Court of Inquiry into the wages and conditions of dock labour, held, under the Chairmanship of Lord Shaw of Dunfermline, in February, 1920. Following the issue of the Court's Report, and the subsequent conclusion of the National Docks Agreement of May, 1920, between the Unions and the provisional Council, the Employers formally constituted themselves into the National Council of Port Labour Employers. The Council was divided into 17 Groups, membership consisting of representatives of employers of dock and riverside labour. The President of the Council was the late Rt. Hon. Viscount Devonport (then Chairman of the Port of London Authority), with Sir Alfred Booth, Bart. (Liverpool) as Vice-President. Sir Joseph Broodbank (London) was the first Chairman of the Executive Committee, with Mr. F. C. Allen (London) and Mr. James S. Spencer (Glasgow) as Vice-Chairmen. Mr. G. Grinling Harris was the first Secretary of the Council.

In 1926 the Constitution was modified, in that membership of the Council was limited to representatives in proportion to the number of dock workers employed within each Group. Mr. F. C. Allen (later Sir Frederick C. Allen, Bart.) was elected Chairman, with Mr. Charles Booth (Liverpool) and Mr. James S. Spencer, Vice-Chairman. Offices were established in the Port of London Authority Building, and Mr. Charles Cullen became Secretary, in place of Mr. Grinling Harris, who could not devote his whole time to that office. Sir Frederick Allen (who died in 1933) was succeeded by Mr. Basil Sanderson (London) in 1934. Mr. Sanderson resigned his office in 1941, owing to war duties, and was succeeded by Mr. R. T. Garrett (London), the present Chairman who received a knighthood in the New Year's Honour List. Mr. James S. Spencer has continued as Vice-Chairman up to and including the present time. Mr. Booth was succeeded as Vice-Chairman in 1941 by Mr. A. Harold Bibby (Liverpool).

Reconstitution.

The reconstitution has been largely inspired by developments of recent years in the labour conditions of the Industry and particularly the decasualisation effected by the Dock Labour Schemes under the Essential Work (Dock Labour) Order set up in the majority of the Ports in Great Britain and the Ministry of War Transport Dock Labour Schemes on Merseyside and Clyde-side. Another notable feature of war-time schemes is the new mobility of labour between ports, which had helped to create an increased awareness of common interests throughout the

country. As a result of these and other factors, fresh problems have been created, many of which demand a wider approach than hitherto.

The Officers of the new Association are the same as those of the former Council, namely, Sir R. T. Garrett, Chairman, Messrs. James S. Spencer and A. Harold Bibby, Vice-Chairmen, and Sir Douglas Ritchie (General Manager of the Port of London Authority), Honorary Treasurer. Mr. Charles Cullen has retired from the Secretaryship and has been succeeded by the writer. The Headquarters of the Association are now at 14, Lees Place, London, W. 1.

The objects of the Association, as set out in the new Constitution, are to secure the fullest consultation and co-operation between all interests concerned in the employment of Port Transport Workers; to provide a medium for the attachment to it of appropriate organisations of Employers with a view to co-operative action and common effort; to operate the conciliation machinery of the Port Transport Industry; and to do all acts and things conducive to the attainment of the foregoing objects.

Membership is open to local organisations representative of Employers of Port Transport Workers; to organisations of Shipowners or their Agents in any Port of the United Kingdom; and to individual employers of Port Transport Workers in ports where no organisation representative of such employers exists. In addition, provision is made for the attachment of such other organisations as are either wholly or in part nationally or centrally representative of particular sections of Port Transport Employers, these ranking as affiliated organisations; the Shipping Federation and the Railway Companies' Association have joined the Association under this provision.

The Group System

The Group System has been retained but in a modified and strengthened form. These Groups are now reduced to eight in number, as follows:

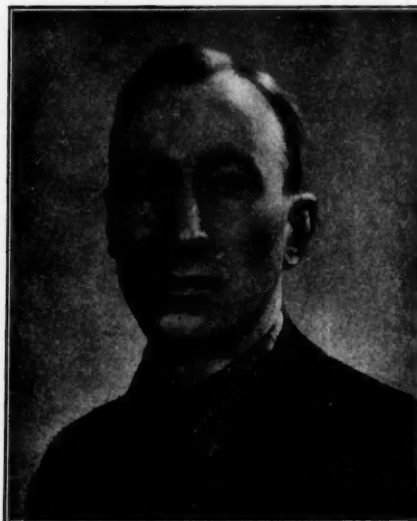
London, and East Coast Ports from Thames Estuary up to and including Boston.
Liverpool, Manchester and North-West Coast of England Ports.
Scotland.
Bristol, Severn and South-West of England Ports to, but not including, Weymouth.
South Wales Ports.
Hull and Humber Ports.
North-East Coast Ports (Berwick to Tees).
Southampton and South Coast of England Ports from and including Weymouth to Dover.

Each is designed to be fully representative of employing interests within its area and is equipped with its own Council and Secretariat.

The governing body of the Association is a Council, consisting of members nominated by the Groups, roughly in proportion to their comparative importance, as well as members nominated by the affiliated organisations. This Council's affairs generally are managed by the Executive Committee, which meets as required. There are also Standing Sub-Committees, to deal with particular departments of business or aspects of policy. The members of the Executive Committee form the Employers' side of the National Joint Council for Dock Labour.

Editorial Communications.

In future editorial communications and articles should be sent to "Marden," 43, Carlisle Road, Eastbourne, addressed to the Editor.



Dr. D. F. MACDONALD.

Legal Notes

Claim by Dock Labourer for Injury received while Cargo Handling

A case was heard at the Liverpool Assizes on January 30th, in which a dock labourer, Christopher Platt, of Colwyn Road, Birkenhead, claimed compensation from Messrs. Alfred Holt & Co., ship-owners, of Liverpool, for injuries due to a scantling of timber which fell out of a sling while it was being lowered into the hold of a ship at Birkenhead Docks on October 30th, 1942.

On behalf of the plaintiff, Mr. Wooll said that bundles of 40 spars about 12 ft. long for holding cargo in position were being slung by derrick into a ship on October 30th, 1942, when one or two pieces fell out and Platt was struck on the head. He was rendered unconscious, and would never again be fit for able-bodied work. It was contended that the spars should have been kept horizontal with a sling on each side, and that there had been a lack of proper supervision and plant.

In the course of his evidence, Platt said he had seen timber loaded with double and single slings. One day a single wire was worked and the next day, a double wire.

Henry Rafferty, a dock labourer, said he was injured at the same time as Platt. Single slings were used for short timber, and in his opinion there was more danger of catching the coamings with one sling than with married gear. If the wire was not tight round the timber, pieces might fall out. At the time of the accident, the timber was about 12 ft. to 14 ft. long. If a single sling was used it came over at an angle, and if two slings were used it would probably be level.

Thomas Watson Bell, a dock labourer, said the piece of timber which fell was about 10 ft. long, and it fell 30 ft. There were 40 to 50 scantlings in the sling, which came over at a slant. It was very seldom the timber was horizontal if only one wire was used, and with that kind of timber it was safer to use two slings.

Albert Edward Taylor, the hatchman, said the scantlings were first put on the deck, and when later they were lifted by a single wire one piece or two pieces shot out of the middle of the sling. Two slings were safer if they were the same length. That accident would not have happened with two slings, and he had never known timber fall out when two slings were used.

In cross-examination Taylor said the usual way of slinging timber into the hold of the ship was the single sling method, and double legs were only used for discharging timber from a ship. There was no need for a single sling to go down at a cant. He knew the sling had been disturbed while the timber was on deck, and he had to be careful to see the sling gripped tight.

Opening the case for the defendants, Mr. Lynskey said the only allegation made against them was failure to provide a proper system for lowering the wood in that they did not ensure the retention of the pieces of wood in a horizontal position and the prevention of pieces from falling into the hatch by employing two slings and tying the pieces of wood together at each end. Counsel submitted that the question for the Court was whether the employers were in breach of their duty to take reasonable steps to provide a safe system in the circumstances. His case was that the method or system adopted of lowering into the hold by a single sling was the recognised and safest method for getting timber in either long lengths or mixed lengths into a hold.

William Boase, master porter and stevedore, said the single sling method was the only method he knew of handling timber in the port of Liverpool. The single sling was the safer method, and, generally, timber was too long to bring up horizontally. If a double sling was used, it might catch underneath the deck, and one lift might slack off and cease to have any pull on it. In the circumstances described in that case he would have used a single sling.

Cecil Richard Sutton, cargo superintendent for Messrs. Rea, Ltd., master stevedores and porters, said the single sling system was the system used in the port of Liverpool and in the United

States. By the single sling system the sling could be kept well clear of the coamings.

Judgment.

Giving judgment for the defendants, Mr. Justice Birkett said Platt, who was earning a weekly wage of £7 7s. 11d., had sustained a severe scalp wound, and suffered from concussion, as a result of being struck by a piece of timber about 10 ft. in length, which was intended to be used in the packing and stowing of lorries. By common experience of all the people in the matter, the use of a single sling had hardened into a state in which it was the only recognised usage, and he was satisfied that the method provided by the defendants was perfectly safe.

Tidal Power for the Generation of Electricity

Advantages of the Severn Scheme

In a Paper on "Tidal Power," delivered before the Junior Institution of Engineers, on Friday the 14th January, Mr. P. H. Abell gave us a justification for a reconsideration of the nation's position in regard to the use of tidal power from the Severn tides for electric power generation, the pressing need for the conservation of coal, and the increased demand for electricity which simplifies the utilisation of the electricity so generated; the high cost of coal, which improves the commercial aspect of tidal power generation when compared with steam stations, and the advance in engineering technique, will have an important bearing on the cost of construction.

The Author referred to Britain's fortunate position, with its high tidal ranges exceeded nowhere in the world except by the tides in the Bay of Fundy, where a maximum high tide of 56.85-ft. has been recorded. Several tidal power schemes have been considered for this locality, the best known of which was the one sponsored by the United States Government for Passamaquoddy and Cobscook Bays, and for which President Roosevelt approved the allotment of £2 million from Emergency Relief Funds to start work. Preliminary work on the foundation has proceeded and much useful research on concrete has been done, but when Congress failed to supply further funds, the number of men working on the scheme was reduced from 3,000 to 400. The scheme is agreed to be technically sound but is difficult to justify economically, as there is no market for the power near Passamaquoddy. This difficulty is not likely to arise with the Severn Scheme.

The Author spoke of two schools of thought amongst engineers on the question of tidal power—(1) those who thought that it should be possible to utilise the electricity direct from the Barrage power station at varying times and in varying amounts, as determined by the state of the tide, and (2) those who thought pumped water storage necessary to secure the availability of the electricity at all times. He thought that the correct view was that the energy could be used direct from the Barrage without storage.

The Author referred to the desirability of waiting for the Report of the three eminent engineers appointed by the Minister of Fuel and Power before reaching any conclusions, but he thought that, based on an average fuel consumption of 1½-lbs. of coal per unit, which will probably be a reasonable figure by the time the Barrage is built, it should be possible to save a million tons of coal per annum by generating electricity from the Severn tides.

The Author stressed the human side of such a great undertaking, which would employ an average of 4,000 men on the construction of the scheme, this number rising for several years to 8,000, representing a town of 10,000 to 15,000 inhabitants. He thought that here was a great opportunity for the planning of a new town, to be all-electric, designed by the best British architects, and that it might not inappropriately be known as The Severn Garden City, to make a worthy home for the men who will create and operate the greatest engineering undertaking of all time.

The New Dry Dock at Cape Town

Remarkable Progress of Work to Date

The following particulars of the rapid progress being made in connection with the construction of the large new dry dock at Cape Town, South Africa, are taken from a despatch dated December 4th last, from a correspondent of *Lloyd's List*, which has been published in that journal.

Reclamation of the site had begun in April, 1942, and dredging operations were commenced soon afterwards. Pile driving for the enclosure cofferdam began in March, 1943. The last pile was driven in August and, fifteen days later, a battery of pumps had cleared the enclosure of water. Before the mud was dry, power driven scoops with a large fleet of lorries were removing hundreds of tons of it daily. Dredgers had previously removed some 715,000 cu. yds. (about 800,000 tons). There remained 213,000 cu. yds. (256,000 tons) to be excavated in the dry. In all 928,000 cu. yds. (1,116,000 tons) of mud, sand and rock had to be shifted.

Concreting of the walls for the shoreward end of the dock was commenced at the end of November. In all, the dock will require about 314,000 cu. yds. (580,000 tons) of concrete. This will include 300,000 cu. yds. of crushed stone which has to be brought 15 miles by rail from the Railway Administration's quarry at Kliphevel. The sea sand at Woodstock beach being unsuitable for concrete, river sand is being brought 40 miles by rail from the Wellington district. Four cranes are now working from the dock floor and are to be augmented by three others, "one of which was launched into the basin in three pieces on specially built ways. The four already at work were picked off the wharves more or less as they stand by the floating crane and lowered into position when there was still nearly 50 ft. of water in the basin. The operation was unique in the history of Table Bay's harbour."

The leading dimensions of the dock as finally approved are as follows: Over-all length, 1,248 ft.; Width at entrance (coping level), 148 ft.; Width of Dock (coping level), 156 ft.; Depth from coping to floor, 56½ ft.; Water over keel-blocks at L.W.O.S.T., 40 ft. and at high water, 46 ft. It is anticipated that the dock will be in commission by 1945.

Proposed Free Port for Quebec

Application to Canadian Government

A public meeting of the citizens of Quebec recently discussed a proposal for the creation of a free port at Quebec, in accordance with a scheme as outlined by the Mayor, Mr. Lucien Borne.

At the close of the discussion, it was unanimously decided to send a petition to Ottawa, which ended as follows:

"That this meeting, comprising representatives of public associations and of prominent private citizens of Quebec, petition the Government of Canada to take immediately the necessary measures to make the port of Quebec a free port, so that this magnificent harbour, advantageously situated at the terminus of the shortest and cheapest route between Canada and foreign ports, may serve efficaciously to the economic expansion of Canada after the war and thus receive the volume of business and trade merited by its geographical position and the incomparable rôle it may play in the development of the commercial relations of Canada with the other nations."

Death of Former Port Official.

The death is announced, at the age of 74, of Mr. Holbourn J. Moscrip, who retired in 1934 from the position of assistant general manager of the Tyne Improvement Commissioners.

The Dock and Harbour Authorities Association.

The address of the above Association has been changed from 13, Victoria Street, Westminster, S.W. 1, to No. 7, Victoria Street (3rd floor).

Welsh Port Development

Review of Progress since 1923

It is of interest to note that it is just 21 years since, on January 1st, 1923, the extensive docks systems, formerly owned by separate companies at Newport, Cardiff, Penarth, Barry, and Port Talbot, were transferred to the unified control of the Great Western Railway. Since that date, the Railway Company have carried out a number of important improvements, more particularly with regard to coal-handling appliances. Formerly, the limiting size of wagon handled was of ten to twelve tons capacity, but now a large number of appliances have been installed capable of handling twenty-ton wagons. An escalator, which reduces the breakage of coal during shipment, and a number of mechanical diggers for clearing wagons of the residue of washed coals, have also been introduced.

Among other equipment provided at the docks are additional quayside cranes for handling general cargo; extensive groups of standage sidings, and several new transit sheds with an equipment of electrically-driven trollies.

Various other important works have been carried out, including the relaying of several miles of worn-out railway track; the improvement of roads on the dock estate; the installation of ship and shore telephones, and the modernisation of the lighting system throughout the docks area.

A large floating crane of one hundred tons lifting capacity has also been acquired for service at the principal docks.

This continuous process of modernisation of their port facilities has naturally involved the railway companies in a very considerable outlay and redounds greatly to their credit.

Theft and Larceny at the Quayside.

During the past month four men have been committed for trial at Manchester Assizes from the Liverpool Police Court accused of conspiring together and with other persons to steal and receive property belonging to the Mersey Docks and Harbour Board, the Ministry of Food and the London, Midland and Scottish Railway Company. A casual dock labourer has been sent to gaol for three months at Belfast for stealing shirts from the Bristol steamer. At Bristol, three employees of the port of Bristol Authority were likewise sentenced to three months imprisonment for stealing four cases of whiskey.

The prevalence and increase of dishonesty at the quayside has been the subject of comment previously in these columns and the foregoing typical instances show how rampant and universal the evil has become. As Mr. Campbell, the Belfast Magistrate said, it has become a real menace to the war effort, and he had a suggestion to make which is eminently worthy of consideration. He thought it was high time the Dockers' Union "should consider the question of assisting the authorities and incidentally the war effort by expelling dockers convicted of this class of offence."

"Expulsion from the union would make way for honest men and honest dockers. If the Dockers' Union took this matter up and make it clear to those who were dishonest that they would be dismissed it would do more than all the magistrates in the country to put a stop to this sort of thing. I am sorry to say that men convicted here of larceny have been started in work again immediately after paying their fines or serving their sentences."

It will be the general sense of the community that a serious responsibility does rest on the men's Union to grapple with this problem and to take drastic steps to eradicate an evil which has grown to intolerable dimensions. It has to be borne in mind that there are many cases of theft in which the offenders and their accomplices, the receivers of stolen goods, cannot be traced or, at any rate, brought to justice, for lack of sufficient evidence to convict.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this Journal should not be taken as an indication that they are necessarily available for export.